PAPER TRADE JOURNAL

VOL. 123, NO. 19 NOVEMBER 7, 1946

WOOD PULP

G

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1886 — 1946

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WOOD PULP
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Ontario Seeks to Settle Woods Workers Strike
Wisconsin Wages Tend Up as Employment Sags
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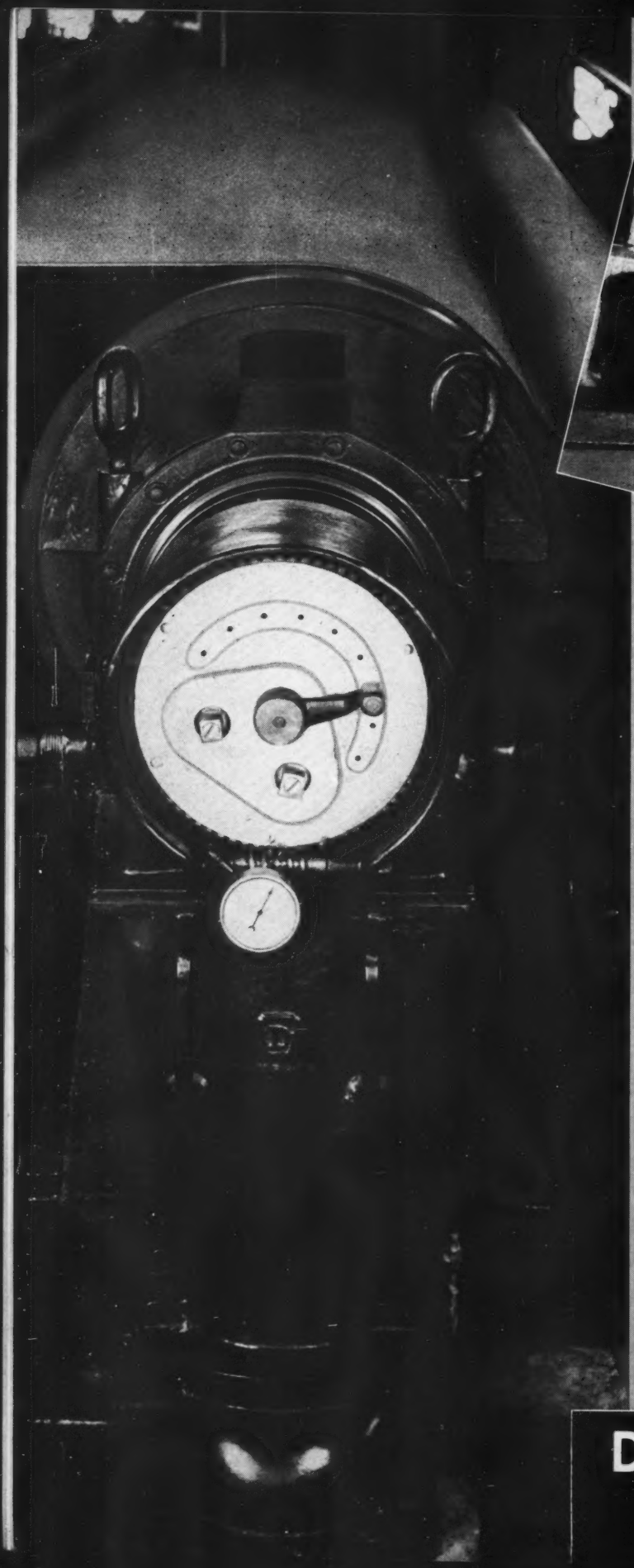

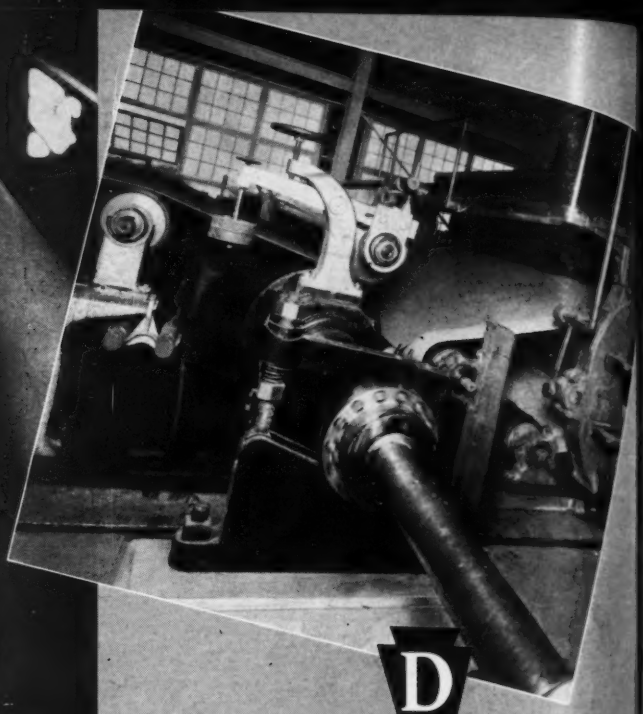

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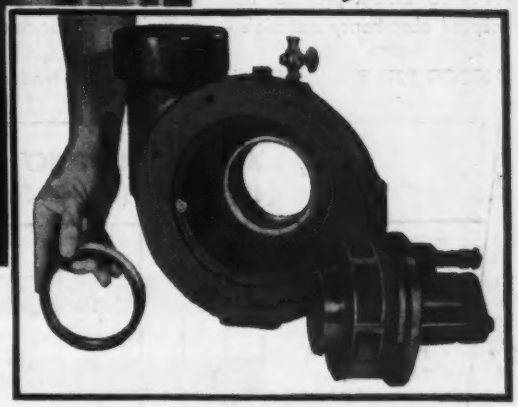

"Electrifugal" PUMP SIMPLIFIES MAINTENANCE

AS THIS photo suggests an "Electrifugal" pump is simple and sturdy in design. Moving parts are few and easy to get at. The pump can be taken apart readily, for inspection and replacement of packings or wearing rings, when necessary.

Compact, rigid design gives you an efficient, quickly installed "package" pump ideally suited to a wide range of applications . . . low in first cost and cost of operation.

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BRONZE WEARING RINGS protect casing from wear. New plastic water seal and five or more generous packings are additional long-life features that cut maintenance costs.

PROVED PERFORMANCE . . . every unit thoroughly tested at the factory; efficiency, capacity and head are carefully recorded and filed for reference. A 2072

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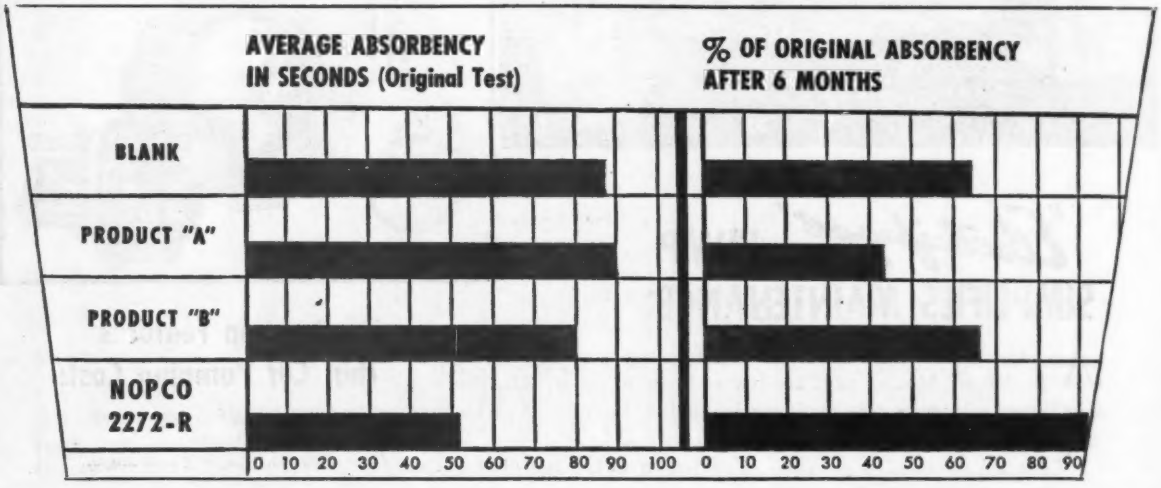
CENTRIFUGAL PUMPS

PAPER TOWELS 26% to 48% MORE ABSORBENT

when you use NOPCO* 2272-R

Here is news of great importance to every manufacturer of paper towels or tissue seeking new and better ways to step up absorbency. Comparative laboratory tests (see chart below) — amply verified by regular mill users — show that NOPCO 2272-R provides faster absorbency than other accepted absorbency materials — as well as longer retention.

NOPCO 2272-R successfully resists the natural tendency of paper to lose absorbency because it "stays with the fibers," thus assuring more lasting absorbency in the *finished* sheet. Manufacturers of specialty papers will also find NOPCO 2272-R particularly helpful because of its compatibility with solutions or dispersions of synthetic resins added to impart wet strength. Economical, too, — depending upon individual mill conditions, only one or two pints of NOPCO 2272-R needed per ton of stock. Write for further details.



Report of the 6-Month Test

Sheets treated with three leading absorbency agents, including NOPCO 2272-R, and a separate group of sheets made from untreated stock were used in the tests.

Each product was added in the laboratory beater to stock composed of 300 grams of unbleached spruce sulfite and 200 grams of bleached aspen sulfite pulp dispersed with 12 liters of water. The stock was intentionally beaten to produce a harsh sheet, considerably below normal absorbency. Several hand sheets were made for testing purposes, following standard procedure.

Some sheets from each group were tested immediately for absorbency. Other sheets were tested at regular intervals for six months. Absorbency was measured by recording the time for 1 drop of distilled water to be absorbed completely into the sheet. Greater accuracy was assured, because these tests were the result of *natural* rather than *artificial* aging.

NOPCO EVOLVED THROUGH RESEARCH

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* Reg. U. S. Pat. Off.

NOPCO 2272-R
For Higher Absorbency

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.
Established 1872

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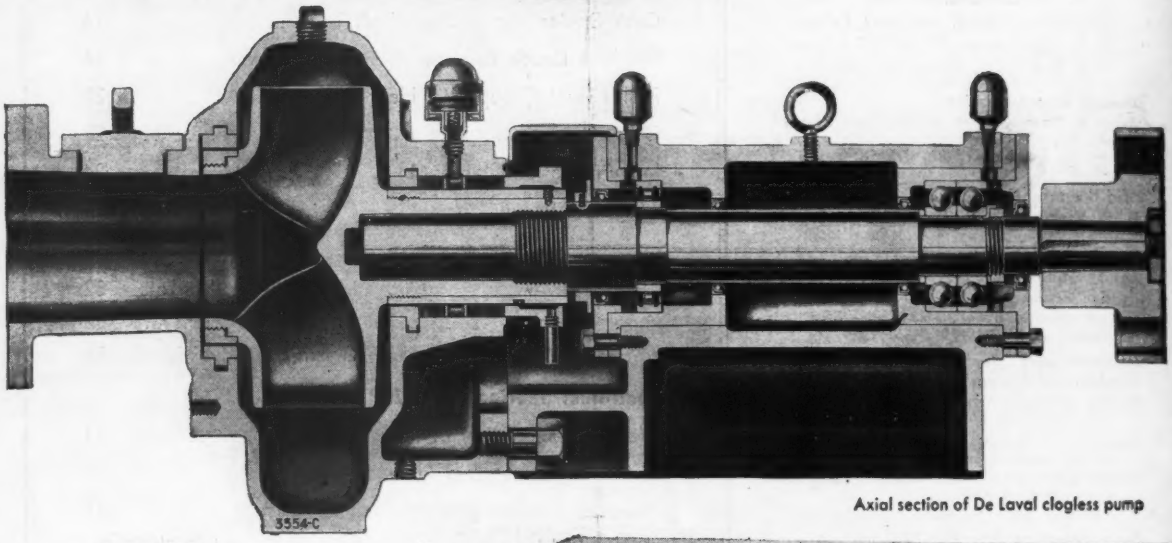

Axial section of De Laval clogless pump

ALL wearing parts in a De Laval Clogless Pump are readily renewable. The pump casing is split at the center line of the shaft to give access to the interior. The efficiency of the pump can be quickly and inexpensively restored by replacing the renewable wearing rings on the impeller and in the casing. Without this De Laval feature replacement, machining or rebuilding of the impeller and re-machining of the casing would be necessary to restore original clearances.

De Laval Clogless Pumps are built for long life, and sustained efficiency. Write for Catalog P-1250.

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TURBINES • HELICAL GEARS
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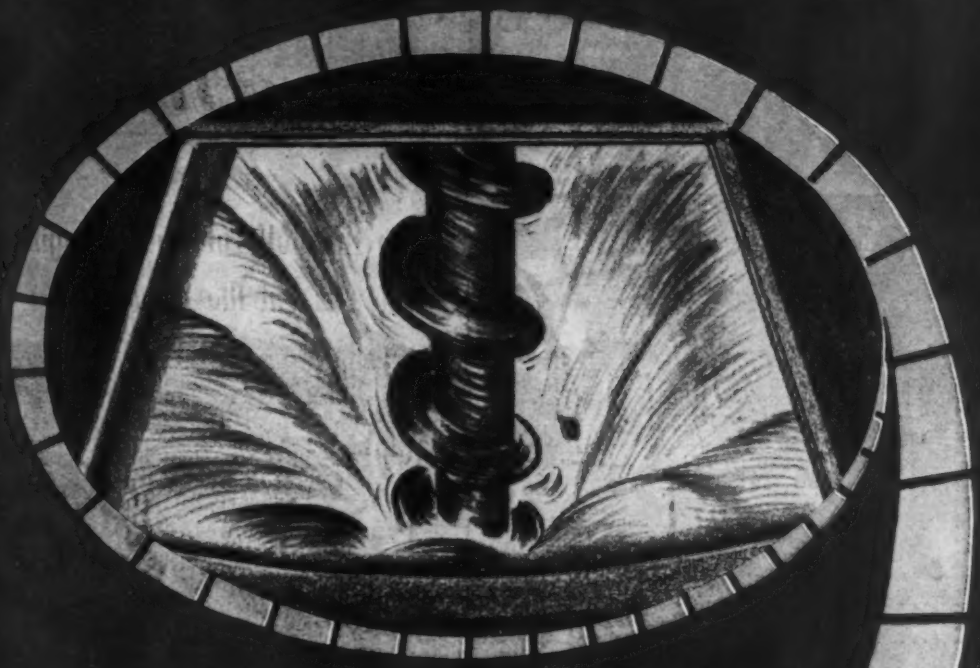

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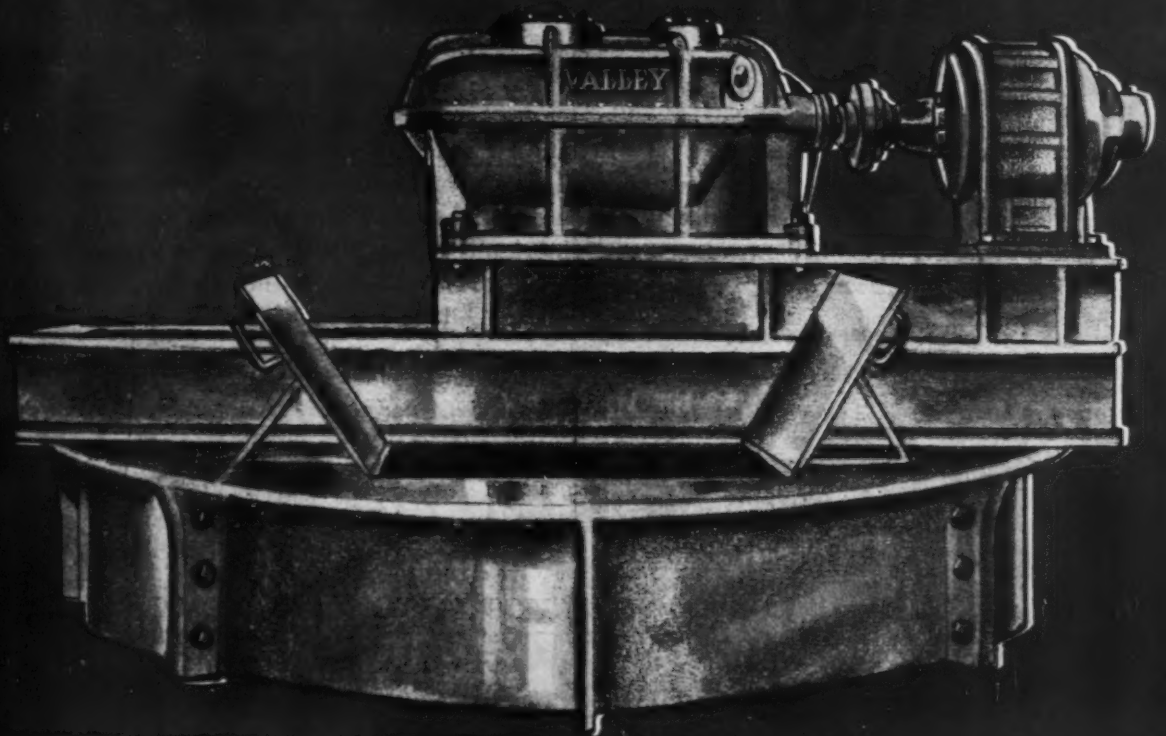
of terrific pulping effects
in <u>ONE</u> GREAT PULPER



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for a long life—

START your new machines and equipment out right—have a Gulf Lubrication Engineer "in the picture" just as soon as it's delivered.

This trained specialist will check over your machines and equipment, then recommend the proper oils and greases which will provide an extra margin of lubrication efficiency.

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helps make machines
produce more at lower cost

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More PULPSTONES *than ever!*

Yes . . . the demand for Norton Pulpstones is greater than ever. From the main Norton plant at Worcester and from the Canadian plant at Hamilton, they are being shipped at the greatest rate in their history—throughout the United States and Canada, to Mexico and South America, to the Scandinavian countries and to many points in the British Empire.

Pulp-mill operators everywhere depend on the Norton Pulpstone—the original manufactured stone—the stone backed by over twenty years' manufacturing experience and application experience.

And the fact that there are two Norton plants, each supplementing the other, assures uninterrupted service.

NORTON COMPANY, WORCESTER 6, MASS.
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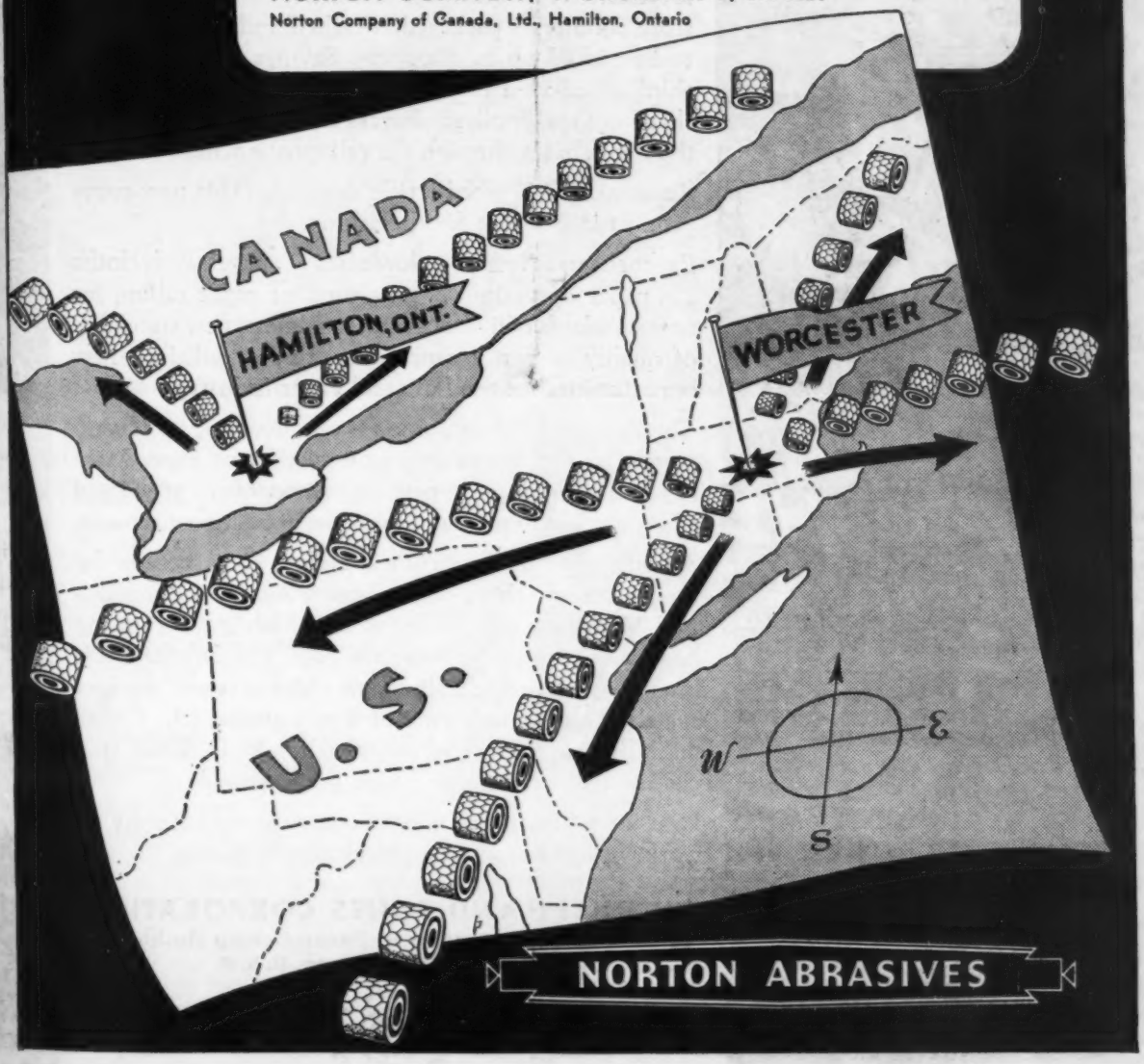


PAPER · · · America's 6th Industry

"WINDOW" BAGS FOR PERISHABLES

NOTE: Several chain grocery organizations are pre-packing fresh produce in specially developed paper "window" bags before it reaches neighborhood stores.

A new type of Kraft paper bag with a "window" of cellophane is revolutionizing the merchandising techniques for fresh fruits and vegetables. Produce is placed on store counters—packaged, weighed and priced—ready to be picked up by shoppers. Savings as high as one-third are effected through the elimination of handling, shrinkage and spoilage. Buyers can judge the quality of their purchases through the cellophane windows.

Reprint of a 600-word article describing this new paper product is available for the asking.

Paper sheets . . . paper pillow cases . . . paper wash cloths . . . paper draperies . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for book and high grade printing papers, one for white paper for bags, and one for Kraft liner board; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for M. G. Kraft specialties, facial tissues, and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

PAPER TRADE JOURNAL
Vol. 123, No. 19 November 7, 1946
Title Reg. U. S. Pat. Off.

Midwest Sees Cloud Neath Silver Lining

CHICAGO — The feeling persists in the local paper market that the industry is due for a rude shock "one of these days." Experienced paper trade observers are not convinced that the tremendous demand for paper which characterizes current markets really means what it seems to mean. One well known trade leader says that, in his opinion, it is impossible for the country to want all the paper it says it wants. He therefore concludes that a tremendous duplication of orders is responsible for much of the condition and is joined by other local trade representatives in the belief that these "false assumptions" will some day catch up with the trade.

Right now the feeling is current that buyers will persist in duplicating requirements over and over again just as long as they feel the market will remain so tight. "Let the market ease up a bit, let paper become more and more plentiful, let the Government change its publicity and its tune," says one Chicago representative, "and those buyers will begin canceling out duplicates in fear of over-buying to a prodigious extent." However, even these students of the market believe that the re-adjustment period will not come until possibly late spring of 1947 — and perhaps even later than that.

Other market reports show that waste paper continued to sell at ceiling prices this week with good supplies being absorbed readily. One informant believes there is a possibility of early decontrol and others are pointing out that supplies are now about in balance with demand. Nothing official has come out of Washington as yet. Secondhand bags were in better demand with prices reported unchanged. Waste rags were about the same as a week ago and wiping rags and roofing rags were said to be in better demand.

U. S. Envelope Sends Bemis To West Coast Division

WORCESTER, Mass. — Charles A. Bemis has been appointed superintendent of the San Francisco division of the United States Envelope Company by E. V. Johnson, company president. He left Worcester November 1 to assume his new post. He has been associated with the envelope company for 19 years, 13 of which he served as a draftsman. He was superintendent of the Logan, Swift and Brigham division for five years.

OPA Raises, Then Decontrols, Eastern Canada Pulpwood

WASHINGTON, D. C.—Pulpwood imported from the three Canadian provinces of Quebec, New Brunswick and Nova Scotia was suspended from price control by the Office of Price Administration on October 31. The suspension follows a determination that ceiling prices established by the Canadian Prices and Trade Board on pulpwood for export are sufficient to insure satisfactory price control, and no purpose will be served in having parallel OPA ceilings. An increase in price ceilings for this pulpwood, effective for one day, October 30, had been granted for the benefit of those who had been selling for some time on an adjustable pricing basis.

Ceiling prices for pulpwood were raised last week by OPA to the levels recently established for sales of this pulpwood in Canada. The increases, ranging from 50 cents to $3.50 a cord, can be paid on all imports from August 19, 1946, when adjustable pricing was authorized pending completion of a study to determine what increases were required.

Canadian domestic ceilings were raised $1 to $4.50 a cord, effective July 8, 1946. Ceilings on imports into the United States will now be the same as prices paid for sales in Canada. Formerly, import differentials ranging from 50 cents to $1 a cord were allowed in addition, but the differentials have now been abolished. The new ceilings range from $8.50 to $18.25 a cord, f.o.b. car at shipping point in Canada.

No change is made in the ceiling prices of pulp and paper products made from this imported pulpwood, so importing mills will have to absorb the higher costs, according to OPA.

Approximately 1,000,000 cords of pulpwood are imported from the three Canadian provinces annually. This represents about 30 per cent of total pulpwood consumption in the northeastern United States, the area where these particular imports generally go.

Consuming mills may compute broker and dealer commissions by the percentage mark-up existing on March 31, 1946, as required by the new price control act.

Paper Starts Moving Into New York City

HOLYOKE, Mass. — The first shipments of Holyoke-manufactured goods to New York since August 31 left this city late last week. Three carloads of paper for that city were made up of less-than-carload orders from several paper mills in the Holyoke area.

For two months now, the truck strike in New York has throttled shipments. Local paper mills have been piling their finished foods for that city in their warehouses and during the past eight weeks have filled about every nook and cranny here.

It will take several weeks to clear up the congestion, even with maximum daily shipments. The truck strike ended Monday, but because there was such a pile up of merchandise at the New York depots, outsiders waited until yesterday before sending anything in.

Ontario Seeks To Settle Woods Workers Strike

TORONTO — Negotiations began at Ontario parliament buildings last Tuesday before Hon. Charles Daley, minister of labor, and Louis Fine, chief conciliation officer for Ontario, between operators and officials of the Lumber and Sawmill Workers Union. Jack Quinn, president of the Port Arthur local, intimated before leaving Toronto Wednesday night, that settlement arrangements had been drafted and that the terms would be voted on by the union membership on Friday.

The terms tentatively agreed upon called for union recognition, a minimum wage of $5 a day and progressive elimination of double-decker beds in the camps, to be replaced by single beds. It was expected that the men would be back to work next Monday, provided the terms were acceptable to the rank and file membership. Presumably the wage rate includes board.

St. Regis Assumes Bryant Operation

NEW YORK—Time, Inc. disclosed late last week that the St. Regis Paper Company (New York) will take over management of the Bryant Paper Company, Kalamazoo, Mich., effective October 31. St. Regis will undertake management of the Bryant Mill, owned by Time, Inc., on a basis similar to that under which St. Regis operates for Time, Inc. the Maine Seaboard Paper Company, Bucksport, Maine, and the Hennepin Paper Company, Little Falls, Minn. St. Regis will operate the Bryant Mill under the new managerial agreement until conclusion of recently inaugurated negotiations for the sale of the Bryant properties to St. Regis.

In taking over management of the Bryant mill, which has an annual production of 70,000 tons of printing paper, Roy K. Ferguson, president of St. Regis, disclosed that Peter J. Massey will be its general manager. Mr. Massey, a former vice-president of H. P. Smith Paper Company, Chicago, will manager the Bryant mill under the general supervision of Lyman A. Beeman, St. Regis vice pres.

Mr. Massey joined the Smith organization in 1940, and during the absence on a war service of C. Carr Sherman, president of the company, he acted as general manager of the firm. He has had wide experience in the paper industry, having been previously affiliated with the W. F. Printing Company, the Consolidated Water Power & Paper Company, the Combined Locks Paper Company, and the Seaman Paper Company.

SAPEYES Hear Jim Bryan Talk About Freight Rates

CHICAGO — The western division of the Salesmens Association of the Paper Industry held a most interesting meeting at the Sherman Hotel on Monday noon, October 14, when J. E. Bryan, traffic manager of the Wisconsin Paper Manufacturers Association, discussed the new proposed rail transportation rates which are now being argued before the Interstate Commerce Commission. Mr. Bryan indicated that all seemed to feel the railroads were entitled to a substantial increase in rates but not to the extent for which they were asking. Mr. Bryan did not comment on the effect of increased rates on the cost of paper, indicating that this was a matter not within the scope of his current responsibilities. The traffic expert was secured by Phil Howard of the American Paper Merchant and adequately introduced by Jim Coy, veteran sales executive of the Flameau Paper Company.

The SAPEYES plan round table meetings until November 18 when another open meeting is planned.

Gypsum Names Newcomb To Head Building Program

BUFFALO, N. Y.—Norman B. Newcomb has been appointed construction superintendent of National Gypsum Company. He will be in charge of all construction in National's expansion program. Mr. Newcomb has had extensive construction experience with the Port of New York Authority, Anaconda Copper Mining Company, Phelps Dodge Corporation and the Vern E. Alden Company.

ROY K. FERGUSON, president of the St. Regis Paper Company, starting the new No. 6 paper machine at the company's Deferiet, N. Y. mill. Shown with Mr. Ferguson are E. F. MARSHALL, general manager of three of the company's northern New York mills, and E. G. MURRAY, in charge of sales of printing, publication and specialty groundwood papers.

Tennessee Mills To Finance Expansion

CHATTANOOGA, Tenn.—According to John S. Fletcher, secretary and general counsel, the Tennessee Paper Mills has filed application with the secretary of state in Nashville to amend its charter to increase the company's authorized capitalization from $600,000 to $1,500,000.

Mr. Fletcher said that the amendment to increase the capitalization was filed in furtherance of plans to expand the concern's plant, located on Manufacturers Road in North Chattanooga.

Under the plan not all the stock to bring the capitalization to the $1,500,000 figure will be issued. Fletcher explained that the capital will be increased only a sufficient amount to take care of the expansion program.

He went on to say that eventually approximately $500,000 in additional stock will be issued in connection with the enlargement. It is expected that the additional stock, which will be common shares having a par value of $100 each, will be taken by the present stockholders.

"The expansion involves the erection of an addition to the plant and the purchase and installation of an aditional papermaking machine," Mr. Fletcher continued. "The huge machine will require an estimated two years for manufacture and installation.

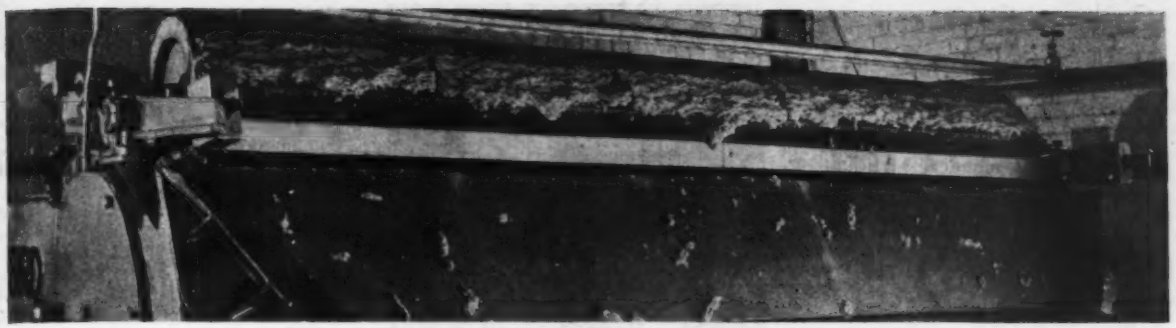
"With the additional facilities completed and in operation, capacity of the plant will be doubled. The company is engaged in the manufacture of paper board of the types used in the production of shipping cases, cartons and used in the manufacture of gypsum board. A portion of the output is now devoted to the latter.

"The State review committee of the Civilian Production Administration, meeting in Memphis last Thursday, approved the application of the Tennessee Paper Mills for the expansion of its plant here. The application called for an expenditure of $172,472 in the building addition, exclusive of the cost of equipment."

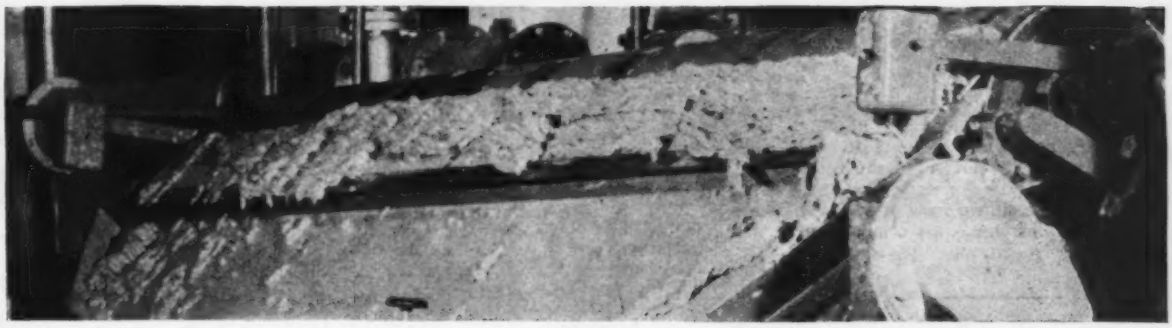
Lafayette to Celebrate Silver Anniversary

NEW YORK — The Lafayette Company, 120 Greenwich Street, specialists in thin papers, will celebrate its twenty-fifth birthday on November 11th with a dinner for the staff at the Park Central Hotel. The company, organized in 1921, was the first to specialize in airmail papers. Its lightweight airmail envelope became a familiar sight to the members of the crew of the Dirigible Hindenberg. The envelopes were tinted inside so that enclosures could not be read.

Operated by women, The Lafayette company is today a leader in the airmail paper field. It handles both domestic and imported papers, and has distribution all over the world.



Are You Letting Good Fibres Like These Get Away?



The fibres the Bird Save-All recovers from your paper machine white water, wet broke and trim represent an increase in production that no mill wants to pass up today.

What's more, the Bird Save-All delivers them at such small net cost per pound that it's downright extravagant to let them go to waste.

A well planned stock recovery system pays for itself in no time under present conditions. Bird engineers have laid out Save-All systems to meet every conceivable mill condition and requirement. Why not make use of their experience?

Simply get in touch with *Bird Machine Company, South Walpole, Massachusetts.*

The BIRD SAVE-ALL

Cadman Stresses Timber Economy

VANCOUVER, B. C.—Unless the pulp and paper industry takes special care to use the country's timber resources "in the most economical way, and by getting the utmost out of each log, the government will tell us what to do, as they did during the war." A. E. Cadman, general manager of the Canadian Pulp and Paper Association, told a luncheon meeting here of the newly-inaugurated technical section of the association's western branch, that if the Canadian pulp and paper industry is to hold its place in world markets, a high standard of production must be maintained.

The necessity of meeting foreign competition was stressed by Norman R. Chappell, of the pulp and paper division, Department of Trade and commerce's foreign trade service.

"The paper industry," he said, "cannot afford to rest on the laurels it earned during the war, but must keep hard on the job to compete with other countries."

Douglas Jones, secretary-engineer, technical section, Canadian Pulp and Paper Association, Montreal, was present on his third visit to the Coast in two years. The meeting was the first held by technical men of the pulp industry under the auspices of the Canadian Association.

Crocker-McElwain Publication Receives Journalism Award

HOLYOKE, Mass.—The Paper News Poster, a publication of the Crocker-McElwain Co. has been selected to receive an award for distinguished industrial journalism in the 1946 contest for company publications sponsored by A.I.M. and the Massachusetts Industrial Editors' Association. The winners were announced at the annual A. I. M. meeting and the certificates of award will be presented publicly at the next meeting of the state organization.

Th award-winning publication was the March issue of the Crocker-McElwain Poster. The four-page issue contained stories on the printing industry, the paper business, and advertising. The French-fold paper, when opened out, features on the inner page a large picture of General Jonathan M. Wainwright, Bataan hero. Under the picture is printed the general's famous victory prayer.

Judges for this year's contest were Erwin D. Canham, editor-in-chief of the Christian Science Monitor; T. O. Armstrong, industrial relations manager of the Westinghouse Electric Corp., and John H. McCullough, art director of the H. B. Humphrey Co.

Bachrach Photo

JOHN H. BREWER

has joined Bulkley, Dunton and Company, Inc., as a sales executive. He was previously vice-president of the Paper House of New Haven and vice-president and general manager of Storrs and Bement, Boston, these connections covering a period of 20 years. Mr. Brewer started his career in 1919 in the manufacturing department of the American Writing Paper Company.

In World War I he served as a flyer, and in World War II he was commissioned in the Army Air Corps. He has served as president of the New England Paper Merchants' Association, vice-president of the Boston Paper Trade Association, and vice-president of the National Paper Trade Association.

Canada Discounts Slump In Newspaper Advertising

TORONTO—Notwithstanding that the relationship between total newspaper advertising lineage and newspaper consumption is a direct one, most Canadian observers are not yet prepared to accept the suggestion that because the United States lineage for July fell below that of the preceding month of this year for the fourth consecutive month, the newsprint supply situation isn't going to be any easier in the immediate future. There are those who point to the seemingly sluggish trend of the paper stocks and attribute the lack of "bounce" following the latest increase in newsprint prices to this "declining" newspaper advertising lineage.

However, the declines in advertising lineage since last March can be accounted for at least partly by seasonal fluctuation. Moreover, for the first seven months of 1946 lineage shows a gain of 25.2 per cent over the similar period of 1945. If pulp and paper stocks are not showing the activity to be expected of them under the circumstances, it is probably because of the general unsettled conditions prevailing internationally, is an opinion more generally expressed.

OPA Denies Rise In Sisal Kraft Tape

WASHINGTON, D. C. — Adjustable pricing authorization granted August 27, to manufacturers of gummed sisal kraft tape and gummed cloth tape was revoked by the Office of Price Administration late last week. The authorization to sell at adjustable prices had been allowed pending completion of a study to determine whether existing price ceilings for these products should be increased. The revocation is effective November 4.

OPA said that gummed cloth tape ceilings were increased September 30, and that in the case of gummed sisal kraft tape no increase is being allowed at this time.

A survey of current costs for gummed sisal kraft tape, including a recent increase in the cost of sisal kraft, which covered 100 per cent of the industry's output, indicates that the industry as a whole is covering average total costs and that present ceilings appear to be sufficient to maintain current output. Under these circumstances, no industry-wide increase can be allowed.

OPA pointed out, however, that individual manufacturers experiencing financial hardship can always apply for an individual adjustment in their ceilings.

Kimberly Neenah Mill Becomes a Laboratory

NEENAH, Wis. — Kimberly-Clark Corporation employes attended open house at the new laboratory in the old Neenah mill Friday evening, November 1. The old mill has been converted into one of the most modern research and development laboratories, to house all Kimberly-Clark activity in that division under one roof.

Brochures were distributed to the employes during the open house. The booklets show, through pictures and text, as well as charts, the entire plan of the technical department, of which H. A. Rothchild is technical director.

A diminutive paper mill in the experimental mill, a physics research section, customer acceptance division, medical development section, and others make up the new unit of Kimberly-Clark Corporation.

Toronto Hears Donnacona Gets More Timber

TORONTO — Another slant to the activity of Donnacona stock that has had persistent rumors concerning the possibility of United States publishing interests buying into Donnacona Paper Company was heard here last week. It is now reported that Donnacona will get 400 square miles of timber limits under an order in council passed by the Quebec government and that this is the reason for the recent activity.

ARE YOU COMPELLED TO USE MORE AND MORE

SHORT FIBERS IN YOUR FURNISH? IF SO, THE

SUTHERLAND

continuous

BEATING AND REFINING

SYSTEM

CAN ASSIST YOU IN MAINTAINING QUALITY

SUTHERLAND REFINER CORPORATION

TRENTON, NEW JERSEY · *Manufactured in the United States by Valley Iron Works Co., Appleton, Wis.*

SUTHERLAND REFINER LIMITED, 319 DRUMMOND BLDG., MONTREAL, P.Q. *Manufactured In Canada By The John Bertram & Sons Co. Ltd., Dundas, Ontario*

Mosinee and Appleton Grant 5-Cent Raise

APPLETON, Wis. — Wage increases for employes of Mosinee Paper Mills, Mosinee, Wis., and the Appleton Coated Paper Company, Appleton, were made public last week.

Raises of five cents per hour, effective November 1, have been accepted by the Mosinee employes who are members of the International Brotherhoods of Papermakers and of the Pulp, Sulphite, and Paper Mill Workers, according to Emil Noren, regional director of the Papermakers. The increase makes a total of 25 cents added to the pay of the Mosinee workers since V-J day, Mr. Noren said. The raises were negotiated by Edward Gilbertson, representing the Papermakers, and Wellington Meyers, representing the Pulp Workers.

Members of the Paper Workers Local 16, Associated Unions of America, have won increases of five cents an hour, retroactive to October 1, at Appleton Coated. This brings the base rate to 83 cents an hour for men and 70 cents an hour for women, exclusive of the shift differential, Don Cameron, national AUA secretary, announced. The agreement provides for the reopening of the wage clause at any time upon a 30-day written notice by either party. Total increases since V-J day now amount to 16 cents per hour.

Papermakers Discuss Wages At Four Wisconsin Mills

APPLETON, Wis. — Members of the International Brotherhood of Papermakers, Local 16, who are employes of four paper mills in Appleton, Neenah, Menasha and Stevens Point, Wis., were scheduled to meet Sunday, November 3, to discuss negotiations between the companies and the union. There are about a thousand members of the union in the mills affected, and they voted recently to strike if negotiations fail, according to Emil Noren, regional director of the Brotherhood.

Company officials and representatives of the union, including Paul Phillip, Albany, N. Y., vice-president of the Papermakers, met Thursday and Friday to discuss the issues, but no conclusion was reported reached.

The companies involved are the Fox River Paper Corporation, Appleton; Whiting-Plover Paper Company, Stevens Point; the Neenah Paper Company, Neenah, and the Gilbert Paper Company, Menasha.

Hinde & Dauch Builds at Trenton

TRENTON, Ont. — Hinde & Dauch Paper of Canada is to have a new one-story warehouse 121 x 202 feet, of concrete and brick, with steel sash, truss and roof. The new warehouse will hold 3,500 tons of finished strawboard for use in the Trenton and Montreal plants and thus release storage space in their Toronto plant. New elevators and a widened receiving-loading platform will be among improvements made at the Toronto plant.

Wisconsin Wages Tend Up Employment Sags Slightly

MADISON, Wis. — Employment in Wisconsin paper and paper products mills declined 1.1 percent during September, but average weekly payrolls went up 0.6 percent during the month, according to a report by the Industrial Commission of Wisconsin. There was a total of 26,400 employes in September compared with 26,700 during August. Weekly payrolls during September were reported at a total of $1,177,000 compared with $1,170,000. Average weekly earnings were $44.61 for 43.8 hours. The hourly rate was $1.018.

In the Milwaukee metropolitan area, 21 firms engaged in the manufacture of paper and allied products reported 2,270 employes, a decline of 2.9 percent when compared with August. The aggregate weekly payroll was $104,898, an increase of 0.2 percent in September, compared with August. Weekly earnings per worker averaged $46.21 for 46 hours, at $1.004 per hour.

Wage Board Limits International Raise

WASHINGTON—The Wage Stabilization Board this week approved three cents of a requested average increase of eight cents an hour for employes in eight southern plants of the International Paper Company.

The board ruled that the unapproved part of the increase might not be used by the company as a basis for seeking higher price ceilings. Labor members of the board dissented.

The board's action brings the approved increases to 15 cents and hour above V-J Day rates for the 10,000 employes.

The board approved the three cents to correct inequities between increases in the Southern segment of the paper industry and increases averaging 15 cents an hour which previously had been granted by the Northern paper industry, the Southern textile industry and the lumber industry nationally.

Britain Lifts Ban on Stationery Paper Items

WASHINGTON—The British Board of Trade has added 36 items to the list of products which will be authorized for importation into the United Kingdom in limited quantities, including numerous paper and stationery items.

Included in the items under the arrangement between the United States and United Kingdom are stationery paper in uncut form, blotting paper, writing paper in large sheets (bond ledger), printing paper for books, text, cover, offset and litho; greeting cards, duplicating paper and Bristol boards.

Kleenex Department Wins Safety Award

NEENAH, Wis. — One million manhours without an on-duty lost-time accident won a plaque for the Kleenex department of Kimberly-Clark Corporation last week. The presentation was made Friday, November 1, by Henry Boon, K-C vice-president, to Frank Witt, who represented the department. The record has never been equalled at the Lakeview mill and the department is one of the largest converting divisions in the plant. Safety meetings and contests stimulated caution and care among the 150 workers involved in the record for the period from July 8, 1944, to November 1, 1946.

The record was made in a department which was entirely manned by girls during the war years, and includes the years of transition and training for new and returning workers, for men now dominate the personnel of the department.

Ernst Mahler, executive vice-president of the corporation, gave a short talk during the program, and Robert Sage acted as master of ceremonies and general chairman of the program. John Woolwage, mill manager, also spoke briefly. Other staff guests at the ceremony were Ralph Kehl and F. W. Werling.

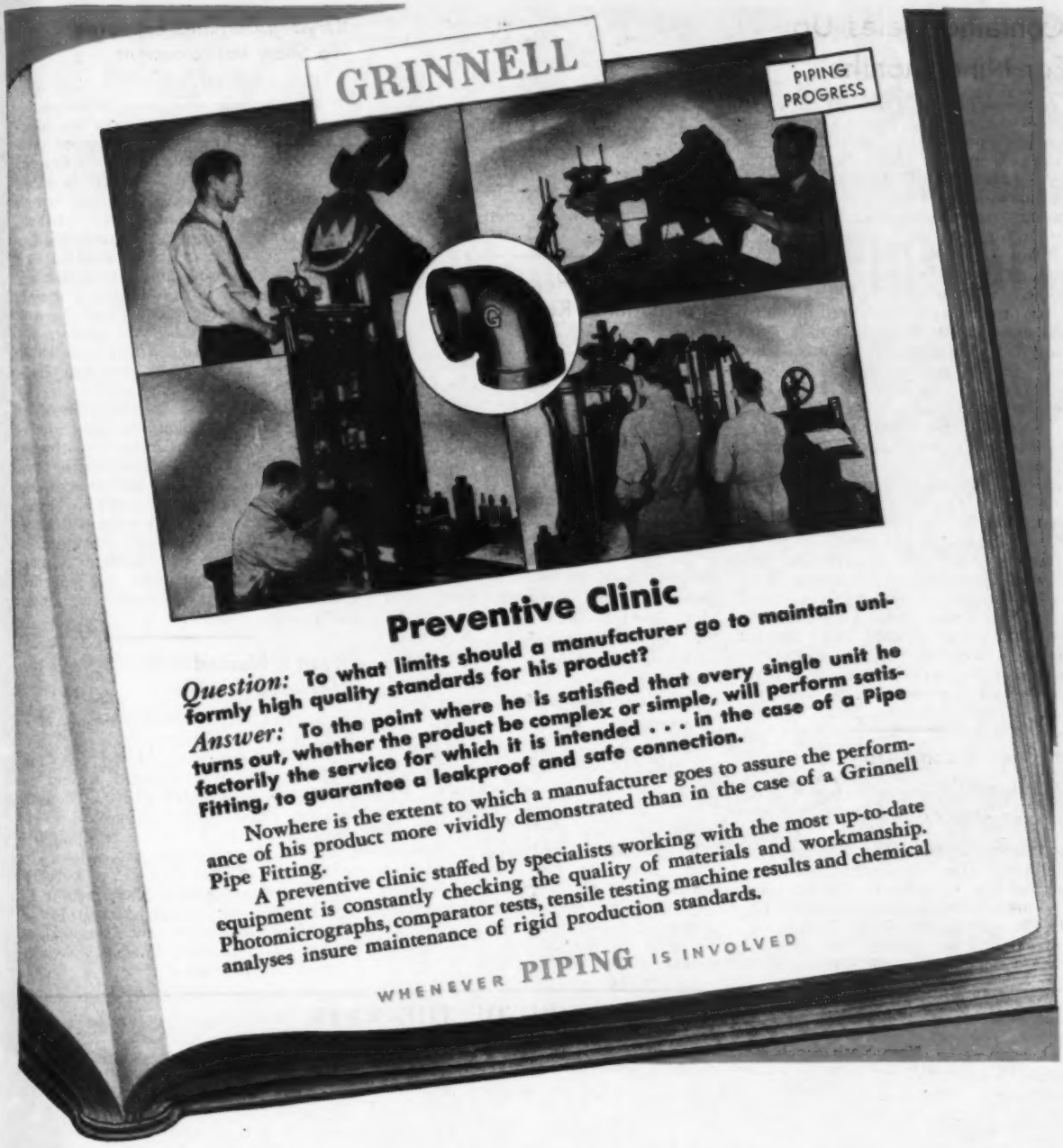
Lakeview superintendents represented included Edward Page, Norman Janssen, Fred Miller, Dean Anderson, Warren Whitlinger, Gerald Schomisch and Robert Stillings.

Strikes Tie Up Wallpaper Mills

JOLIET, Ill.—Operation of six wallpaper mills here, and two others in the near vicinity, was interrupted this week when a strike of ninety machinists kept 1200 other workers away from their jobs. The strike was called by the machinists of Local 24, district 108, of the AFL International Association of Machinists, because, it was reported, negotiations broke down in their demand for 36 cents an hour wage increases. The other workers refused to pass their picket lines. The Joliet companies affected are the United Wallpaper mill, Star Peerless mill, Midwest mill, Superior mill, Joliet mill and Lennon Wallpaper mill. The others were the Atlas mill in Coal City and the Mokena Wallpaper mill at Mokena.

Norton Union Elects Sundstrom

WORCESTER, Mass—C. Harry Sundstrom was elected president of the Abrasive and Machine Workers' Union, Norton Company, at an organization meeting last week. Other officers elected were James J. Cousins, correspondent; Irving S. Smith, secretary; Iris Hammar, treasurer; William J. Eddy, member of executive council.



Preventive Clinic

Question: **To what limits should a manufacturer go to maintain uniformly high quality standards for his product?**

Answer: **To the point where he is satisfied that every single unit he turns out, whether the product be complex or simple, will perform satisfactorily the service for which it is intended . . . in the case of a Pipe Fitting, to guarantee a leakproof and safe connection.**

Nowhere is the extent to which a manufacturer goes to assure the performance of his product more vividly demonstrated than in the case of a Grinnell Pipe Fitting.

A preventive clinic staffed by specialists working with the most up-to-date equipment is constantly checking the quality of materials and workmanship. Photomicrographs, comparator tests, tensile testing machine results and chemical analyses insure maintenance of rigid production standards.

WHENEVER **PIPING** IS INVOLVED

Grinnell's investment in modern testing and inspection equipment is a willing contribution to assure that every connection made by a Grinnell Pipe Fitting is leakproof and safe. To many this may seem like an unnecessarily high standard. To those responsible for the erection and performance of piping it represents a dependability in quality which prompts them to turn to Grinnell for everything in piping from a tiny tube fitting to a complete power or process piping installation.

GRINNELL COMPANY, INC., Executive Offices, Providence 1, R. I. Branch warehouses in principal cities. Manufacturing Plants: Providence, R. I.; Cranston, R. I.; Atlanta, Ga.; Warren, Ohio; Columbia, Pa.

GRINNELL

WHENEVER **PIPING** IS INVOLVED

Container Sales Up For Nine Months

LONG ISLAND CITY, N. Y.—Consolidated net sales of National Container Corporation and its subsidiaries for the nine months ended September 30, 1946 amounted to $18,979,787.56 compared with $14,344,230.77 for the nine months ended September 30, 1945. Net profit for the nine months ended September 30, 1946, after all charges including Federal Taxes based on income, totalled $3,330,140.20 which after provision for preferred dividends amounted to $4.08 per common share on 801,003 common shares outstanding as at September 30, 1946. This compares with net profit of $952,945.84 for the nine months ended September 30, 1945 and $1.40 per common share on 660,964 common shares outstanding as at September 30, 1945.

Net profit for the period July 1st to September 30, 1946, after all charges including Federal Taxes based on income, totalled $1,590,070.80 which after provision for preferred dividends amounted to $1.93 per common share on 801,003 common shares outstanding on September 30, 1946. This compares with net profit of $320,571.89 for the period July 1st to September 30, 1945 and forty-five cents per common share on 660,964 common shares outstanding on September 30, 1945.

St. Regis Income Up 37 Per Cent

NEW YORK—Net income of St. Regis Paper Company for the first nine months this year amounted to $3,914,052, after all charges and taxes, equal to 85c per share on the outstanding common stock, compared with $2,545,448, or 62c per share, in the corresponding 1945 period. Net sales for the nine months ended September 30 aggregated $56,438,324 compared with $38,015,888 in the same period in 1945.

Net income before taxes totaled $6,311,199 for the last nine months, compared with $4,735,227 during the corresponding period last year.

Roy K. Ferguson, president, explained that the last nine-month earnings report does not reflect the $1,500,000 profit realized from the sale of securities.

Great Lakes Headed For Earnings Record

TORONTO — According to official information to "Financial Council," net earnings of Great Lakes Paper Company, Ltd., for the eight-month period ended August 31, 1946, after all charges, including provision of $714,000 for income and excess profits taxes and $456,000 for depreciation, are estimated at $712,000. Operating profits, before taxes, aggregated $1,426,000. Trends indicate the current quarter may be the best in the company's history. Assuming that profits for the four final months only approximate the averages from July and August, the net for the twelve months ending December 31, would be around $1,200,000, compared with $321,312 for last year. On this basis the earnings on the common shares could be around $4.15 a share. However, this does not take into consideration the recent increase in the price of newsprint and savings in bond interest charges effected by the recent refunding. President Earl Rowe made a statement at the special general meeting in June that dividends on the common could be reasonably anticipated in the not too - too - far - distant future.

Dryden Earnings Expected To Show Improvement

TORONTO — Dryden Paper Company, it is reported, will show a good increase in sales and a sharp improvement of net profits for the fiscal year that closed September 30 last. Operations were favored with an abundant supply of pulpwood, a condition which it enjoyed in common with nearly every unit of the Canadian pulp and paper industry, and a demand for its products that ran far beyond its ability to supply with its output. The mill operated at around capacity.

A second advantage was an increase in the market price of its two chief products, kraft paper and sulphate pulp. While operating profits of the company had shown improvement during the war period, it was only in the present calendar year that a broad program of capital expenditures for modernizing the plant and extensions to the pulp and paper facilities began largely to come into effect. Since October 1, 1940, these expenditures have amounted to $1,390,000, and, apart from an increase in capacity, have made a very material saving in operating costs.

Ryan Is Named Norwood Trustee

NORTHAMPTON, Mass.—In an election before Bankruptcy Referee Walter L. Stevens, Atty. Luke F. Ryan of this city was selected to act as trustee in bankruptcy and take control of the assets of the Norwood Engineering Co. of Florence. A creditors' committee, including Atty. John F. O'Connell of this city, Atty. Bernard A. Riemer of Boston, Atty. Arthur T. Wasserman of Boston, Atty. John B. Reigeluth of Boston and Harry Markowitz of Syracuse, N. Y., was also elected at the session.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending November 2, 1946

STOCKS

	High	Low	Last
A. P. W.	5¾	4¾	5¾
Armstrong Cork Co.	46½	43¾	45¼
Celotex Corp.	27⅝	24½	27⅜
Celotex Corp., pf.	21	20½	20⅝
Certain-Teed Products Corp.	18½	15½	18¼
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	24½	22	24
Champion Paper & Fibre Co., pf.	112	112	112
Congoleum Nairn Co.	27¾	24¼	27¾
Container Corp. of America	44½	39¾	44½
Continental-Diamond Fibre Co.	9¾	8⅜	9⅝
Crown-Zellerbach Co.	29	26	29
Crown-Zellerbach Co., pf.	107	106	106
Dixie Cup Co.	33½	31	33½
Dixie Cup Co.—A	53	52	53
Flintkote Co.	29½	25½	29⅜
Flintkote Co., pf.	109	109	109
Robert Gair	8½	7⅝	8½
Robert Gair, pf.	19⅞	19⅜	19⅞
International Paper Co.	45¾	41½	45⅜
International Paper Co., pf.	103½	102	102
Johns-Manville Corp.	127⅞	115	127⅞
Johns-Manville Corp., pf.	121	117	121
Kimberly-Clark Corp.	24¾	21¾	24¾
MacAndrews & Forbes	34	32⅜	34
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	52¾	49½	52¾
Mead Corp.	22⅛	19¼	20⅝
Mead Corp., pf. 4½	...	...	...
Mead Corp., pf. 2	47	43½	46¾
National Container Corp.	32⅛	28	32
Paraffine Companies, Inc.	60	57¼	60
Paraffine Companies, Inc., pf.	107½	107½	107½
Rayonier, Inc.	19¾	17¼	19¾
Rayonier, Inc., pf.	36½	35¾	36⅜
Ruberoid Co.	54	48½	54
Scott Paper Co.	46	42½	43½
Scott Paper Co., pf.	103½	103⅜	103⅜
Southerland Paper Co.	43	41⅛	42¾
Union Bag & Paper Corp.	29	25⅛	29
United Paperboard Co.	12½	11½	12½
U. S. Gypsum Co.	107	100	107
U. S. Gypsum Co., pf.	192	192	192
West Virginia Pulp & Paper Co.	40½	38½	40½
West Virginia Pulp & Paper Co., pf.	113½	113½	113½

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 3¼s '60	102½	102½	102½
Certain-Teed Products Corp. 5½s '53	....	....	....
Champion Paper & Fibre Co. 3s '65	....	....	....
International Paper Co. 5s '47	....	....	....
Mead Corp. 3s '66	103¼	103¼	103¼

New York Curb Exchange

High, Low and Last for Week Ending November 2, 1946

STOCKS

	High	Low	Last
Great Northern Paper Co.	41	40	40
Hummel-Ross Fibre Corp.	15⅜	14½	15
St. Regis Paper Co.	10	8½	10
Taggart Corp.	7½	7	7

BONDS

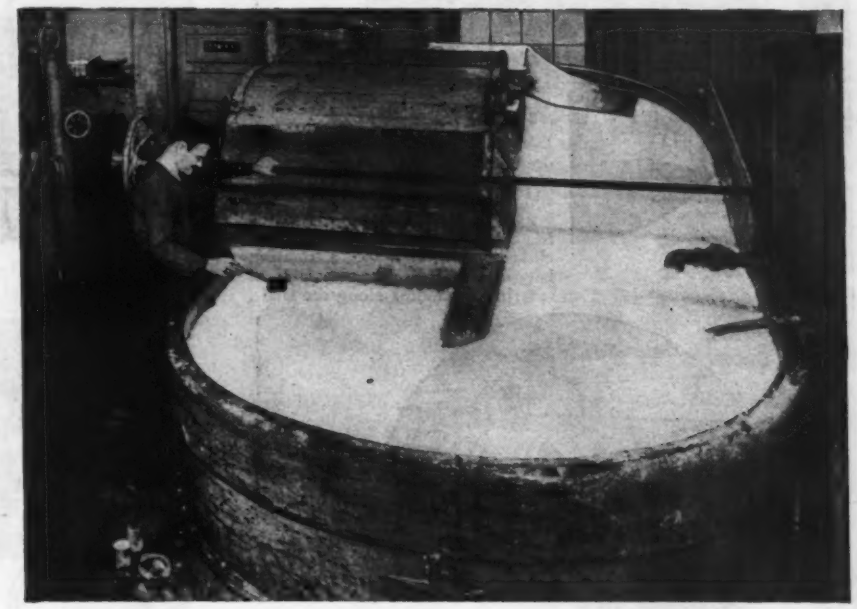
American Writing Paper Co. 6s '61	....	....	....

SPECIFY "GENERAL CHEMICAL"

for quality papermaking chemicals

GENERAL CHEMICAL COMPANY
products for the paper industry

- Aluminum Sulfate (Standard and Iron Free)
- Copper Sulfate
- Muriatic Acid (Hydrochloric)
- Sodium Fluoride
- Sodium Silicate
- Sodium Metasilicate
- Glauber's Salt (Crystal or Anhydrous)
- Salt Cake
- Sodium Sulfide
- Sodium Hyposulfite
- Sodium Sulfite (Anhydrous)
- Sodium Bisulfite (Solution or Anhydrous)
- Disodium Phosphate
- Trisodium Phosphate
- Tetrasodium Pyrophosphate
- Sulfuric Acid
- Nitre Cake (Sodium Bisulfate)
- Nitric Acid



Making quality paper depends to a large extent on the quality of the chemicals used. General Chemical Aluminum Sulfate, for example, either in the Standard or Iron Free grades, will help maintain quality in your paper from the start. General Chemical's carefully controlled production methods insure "Alum" of uniform quality and concentration, and a low percentage of impurities.

Next time, specify these quality General Chemical products for *your plant:*

ALUMINUM SULFATE

Standard—Lump, Ground 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh.

Iron Free—Lump, approx. 2½"; Ground, thru 8 mesh.

SODIUM SILICATE

Solutions: from 38°—60° Baumé
Appearance: Opalescent to clear
Wt. Ratio (Na_2O to SiO_2) from 1:2.00—1:3.40

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In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

FOR TODAY'S *Tougher Jobs...*

Where It's Wet

Even the toughest, wettest weather doesn't bother the new totally enclosed Tri-Clad motors. Cast-iron end shields are machined to provide a tight seal. Motor leads are sealed in a nonshrinking compound. Long, close-running fits, and a rotating labyrinth seal, keep moisture from entering the motor along the shaft.

Where It's Corrosive

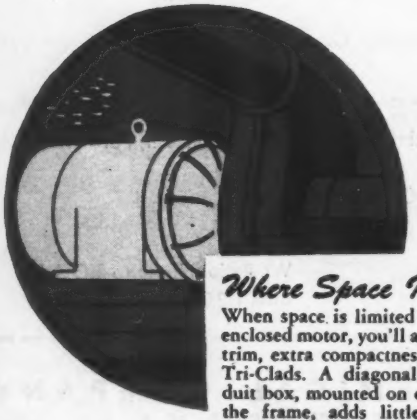
Acids, alkalis, corrosive fumes, and vapors are kept out of these sturdy new Tri-Clads by tight joints treated with special sealants. Corrosion-resisting screws hold conduit-box covers tightly. Tough Glyptal* paint gives protection from corrosion.

Where It's Dirty

Dirt and dust that cut motor efficiency and shorten motor life can't get into these sealed, totally enclosed Tri-Clad motors. Smooth easy-to-clean surfaces and rounded contours enable these Tri-Clads to look good even in dirty surroundings.

Where Iron Dust Flies

Harmful iron dust and metallic filings can't get past the inner wall of these new Tri-Clads. Bearings are safe from gritty dust in cast-iron housings cast integral with end shields. Long, close-running fits and a rotating labyrinth seal stop dust infiltration along the shaft.



Where Space Is Tight

When space is limited for a totally enclosed motor, you'll appreciate the trim, extra compactness of the new Tri-Clads. A diagonally split conduit box, mounted on either side of the frame, adds little to over-all motor width. These motors do a big job in a little space.

Where Explosion Hazards Exist

The new Tri-Clad totally enclosed motor is available in explosion-proof and dust-explosion-proof constructions with special features that make it suitable for Class I, Group C (through 15 hp) and Group D, and Class II, Groups E, F, and G, locations. All sizes tested and listed by Underwriters' Laboratories, Inc. Also in Bureau of Mines construction (Schedule 2E).

HERE'S A NEW *Tougher Motor*

THE G-E TRI/CLAD TOTALLY ENCLOSED MOTOR

1 to 1000 Hp

Enthusiastic reception of the Tri-Clad open motor, with its *extra protection* features, proved that industry was waiting for a motor with protection built in. And, since 1940, more Tri-Clad motors have gone into service than any other integral-horsepower motor.

Now General Electric is ready with a new line of Tri-Clad motors—totally-enclosed, fan-cooled motors—the toughest motors we've ever built.

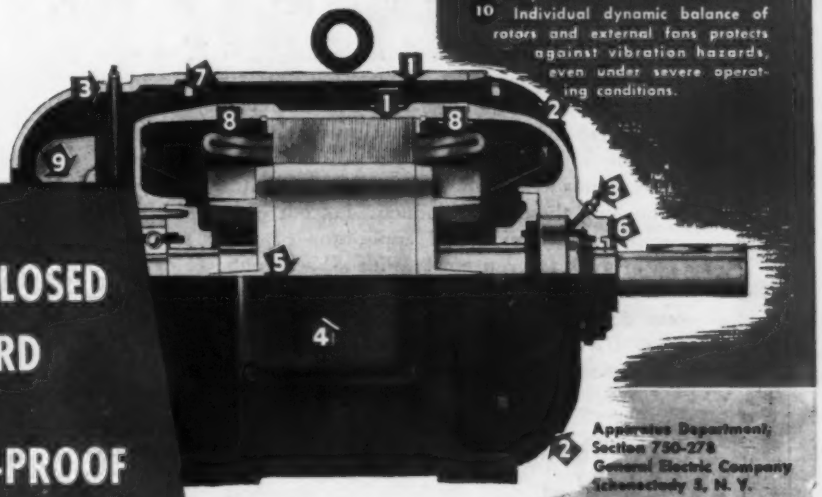
These new Tri-Clads are designed and built specifically for use in many adverse atmospheres—in iron dust, out of doors, in hazardous areas, and chemical atmospheres. *We believe that they are industry's most dependable motors.*

Their scope of application is as wide as the field of industrial motor use. Safeguarded against most sources of motor damage, their longer life and lower maintenance will make them a sound investment on almost every job.

**Trade-mark Reg. U.S. Pat. Off.*

10-POINT PROTECTION

1. A cast-iron, double-wall frame completely encloses and protects the windings and punchings.
2. Corrosion-resistant cast-iron end shields are machined to provide a tight seal, and protect the motor from dust, dirt, and moisture. Primer and finish coat of protective Glyptal affords high rust-resistance.
3. A pressure-relief greasing system, which can be packed with long-life lubricant, protects the bearings.
4. The cast-iron conduit box is diagonally split for easy wiring. Boxes are independently explosion-proof on Class I motors.
5. Nonshrinking compound around motor leads protects motor interiors from dust and moisture at the point where leads pass through the frame.
6. Rotating labyrinth seal further protects motor interior from damage by foreign matter.
7. Large air passages provide adequate protection from overheating. Easy to keep clean and open, too.
8. Modern, "ageless" insulation treatment includes windings of Formex* magnet wire.
9. Removable external fan is of the nonsparking type in explosion-proof motors.
10. Individual dynamic balance of rotors and external fans protects against vibration hazards, even under severe operating conditions.



TOTALLY ENCLOSED STANDARD and EXPLOSION-PROOF MOTORS

FOR THE COMPLETE STORY

Apparatus Department, Section 730-27B, General Electric Company, Schenectady 3, N. Y.

Please send me GEA-4400, which describes the new Tri-Clad totally enclosed motors. Please send me GEA-4141, "Motors and Control for Hazardous Locations."

NAME.....

COMPANY.....

ADDRESS.....

GENERAL ELECTRIC

730-27B-5080

Professional Group Will Hear Taylor

CHICAGO — The Professional Paper Group will hold its next meeting on Monday evening, November 18, in the dining rooms of the Chicago Bar Association. The guest speaker will be M. N. Taylor, executive director of "Trees for Tomorrow, Incorporated." Mr. Taylor will speak on "Reforestation," on behalf of the non-profit organization of the Wisconsin Valley Paper Making Industry founded to help advance reforestation. Inasmuch as the development of our forest resources is of vital interest to all, and particularly to members of the Group, the talk is expected to be of extreme value. It is expected to cover a detailed description of what is being done to preserve and increase the forest crop.

The October 21 meeting was highlighted by the presence of K. P. Geohegan, National Executive Committeeman of TAPPI. Mr. Geohegan presented the Group with the Charter and Banner in recognition of their formal affiliation with TAPPI as a local section. In his presentation, Mr. Geohegan outlined the functions of TAPPI and described the benefits that would accrue with affiliation. He complimented the Chicago Professional Paper Group on its wide diversity of interests and membership and urged close cooperation with their section to the mutual advantage of all.

The next portion of the October 21 meeting was a presentation by Vaughn Jones, service manager of Hill Blackett & Company, on the subject of "Advertising." He covered in minute detail the functioning of an advertising agency, described the copy-writing, art work and space buying functions that all go into the making of an advertising campaign.

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OBITUARY

Verne E. Kirby

ST. MARYS, Ga. — Verne Ernest Kirby, 38, pulp mill superintendent for St. Marys Kraft Corporation, died at his home a month ago. He was born at Britton, N. D., but most of his school days were spent in the state of Washington. He entered the pulp and paper industry in 1926 at Camas, Wash., for the Crown Zellerbach Corporation and was transferred to Port Townsend in 1928.

He worked for Champion Paper and Fiber Company at Pasadena, Texas, the Chesapeake Camp Corporation, Franklin, Va., and in October, 1940, he went to Northern Kraft Corporation, Howland, Me., as general superintendent. He later joined the Hummel Ross Fibre Corporation at Hopewell, Va., and in December, 1943, he went to St. Marys, Ga., with St. Marys Kraft Corporation.

Mr. Kirby was a member of the Technical Association of the Pulp and Paper Industry and the American Pulp and Paper Mill Superintendents Association.

He is survived by his widow, Mrs. Florence A. Kirby and a son, Carl E. Kirby of St. Marys, Ga.; two daughters, Jean and Jeanette Kirby of Port Townsend, Wash.; his mother, Mrs. J. T. Kirby of Wenatchee, Wash.; a brother, C. Frank Andersen of Snaqualmie, Wash.; and a sister, Mrs. Robert E. Long, of Pullman, Wash.

Erich Opfermann

Erich Opfermann died on September 10, 1946, at Baden-Baden, Germany. Dr. Opfermann was formerly secretary of the German TAPPI and was a consultant for I. G. Farbenindustrie A/G. until he was forced into retirement for failure to cooperate with the Nazi regime. He was born on September 5, 1877, in Kircheimbolanden, Germany, and was the first chief chemist for A/G. Zellstoff und Papiefabrikation, Aschaffenburg and later Koln-Rottweil A/G.

He was best known for his work in the development of high-alpha cellulose and the pulp purification for dissolving. He was one of the first to develop a bleached sulphate pulp with an alpha cellulose content above 93 per cent and with an analysis similar to bleached linters.

Dr. Opfermann was formerly a member of the Technical Association of the Pulp and Paper Industry.

Judge Jolin Attacks Army's Closed Mind

MENASHA, Wis.—Attacking what he termed the "closed mind" of the Milwaukee office of United States Engineers, Judge Gerald Jolin, speaking for the Fox and Wolf River Control Association, said that no other obstacle but the stubborness of the engineer office could deny the people in the Fox and Wolf River valleys the benefits which the control association's proposal would provide.

His talk was delivered before the Fox River Valley Chapter of the Wisconsin Society of Professional Engineers on Friday evening, November 1, at Hotel Menasha.

Judge Jolin asserted that a survey was made in the early nineteen twenties and that the engineers had not opened their minds to changed conditions which affected the ratio of costs to benefits, and charged a lack of imagination to conceive of reservoir capacity sufficient to control the flow of the rivers.

He reminded his audience that TVA, Boulder Dam, Grand Coulee and Bonneville dams were not conceived by men with closed minds and asked the Professional Engineers Society to make an independent survey to present to Congress through the Wisconsin members.

Judge Jolin also said that the river control association proposal is based on the sound principle that if you hold even a hatful of flood water and release it when the river is low you thereby benefit farmers, industry, recreation, health and sanitation facilities, and the federal engineers' arguments as to why reservoirs won't work sounded like the arguments against the horseless carriage.

Others addressing the Engineer society were H. F. Weckwerth, manager of the Kaukauka Utility, and M. W. Kyler, manager of the Wisconsin Valley Improvement Association, Wausau.

United Wallpaper Moves Purchasing Department

CHICAGO — The purchasing department of United Wallpaper, Inc., heretofore located at the company's Chicago plant at 3330 West Fillmore Street, opened for operation on the 22nd floor of the Merchandise Mart as of Monday, Oct. 28, it is announced by William H. Yates, United president. John Mazouch is director of purchasing for United and its subsidiaries, Trimz Co., Inc., and Varlar, Inc.

United, the world's largest manufacturer of wallpaper, recently took a ten-year lease on the entire 23rd and 24th floors and part of the 22nd floor in the tower of the Merchandise Mart. The treasury, accounting and controller's departments have already moved from the Fillmore Street plant to the 24th floor of the Mart. In the near future other general and executive departments now located either at the Fillmore plant or on the sixth floor of the Mart will move to the 23rd floor of the Mart.

Purpose of the moves is to consolidate all home office departments.

Taylor Tells Kiwanis of Trees for Tomorrow

NEENAH, Wis.—Accomplishment of Trees for Tomorrow, Inc., and the aims and objectives of the non-profit organization of the Wisconsin river valley paper manufacturers were described October 23 by M. N. Taylor, executive director, in an address before the Neenah Kiwanis club.

Mr. Taylor said that a well-organized reforestation program is underway in the state, but that a mammoth task is involved in reforesting northern areas which are not suitable for good farming. Using charts, he showed the 26 counties of northern Wisconsin with their cut-over areas where part of the reforestation project is being conducted, and expressed the need for long-term, large-scale reforestation in a state which has only nine per cent of the supply but sixty-two per cent of the paper-making units. "By 1970," he said, "these 26 counties should be entirely reforested."

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Instrumentation Studies. LV*

Determination of the Bonding Strength of Paper. I. Progress Report on the Development of a New Method

By The Staff of The Institute of Paper Chemistry

Formation of Viscous Film on a Wheel

An important variable of the method is the thickness of the film of viscous fluid applied to the rim of each wheel. After consideration of various means for applying a thin film to a cylindrical surface, it was concluded that the most satisfactory was that provided by a carefully spaced doctor blade. A tool giving rise to the desired type of doctoring action is shown in Fig. 5. This tool is comprised mainly of a body of brass (B) which rides upon the cylindrical surface of a wheel. Mounted upon this body is a sharp, very straight steel blade (A), the exact position of which may be controlled through the screws which hold it in place. The body was mounted in a lathe, and thin, circular feet (F) were cut with a curvature equal to that of the rims of the wheels upon which the tool rides when a film is to be formed. These circular feet ensure that the doctor blade is maintained at a fixed distance from the rim on which the feet slide.

An excess of the fluid is placed in the pocket (P) and, with the tool held firmly against the rim of a wheel, the wheel is rotated in the direction indicated in the figure. This rotation is effected by means of a small hand crank, which fits into the end of the shaft. The film is formed when the wheels are held in the elevated position by means of the lever and catch previously mentioned in the discussion of Fig. 2.

The temperature of the film is determined by means of a thermocouple, which is pressed against the steel wheel at a point near the rim. As shown by data to be presented subsequently, accurate knowledge of the film temperature is important.

That part of the rim from which the tool is removed is wiped clean, and the wheel is turned so that this film-free area rests upon the specimen. This eliminates an initial slip of the wheels which was responsible for hidden errors in much of the preliminary work.

The film thickness may be ascertained by the simple method of physically removing all the film by scraping, followed by weighing of the (small) scraper on an analytical balance having a sensitivity of the order of 0.1 mg. Knowing the weight of the scraper and the density of the fluid, the film thickness may be quickly obtained. An estimate of the reliability of the method may be inferred from the fact that a film of thickness 0.0005 inch on a cylinder 4 inches in diameter and 0.5 inch in length weighs in the neighborhood of 40 mg. Measurements of film thickness by this gravimetric method check closely with estimates of the slit opening based on the use of a feeler gage.

When a film of a very viscous fluid is formed, a considerable force must be applied to the film-forming tool. Since this force is sufficiently great to tire the hand quickly, use is made of a short length of pointed rod which is wedged between the tool and a fixed structural member in such manner that a greater frictional drag gives rise to a greater thrust of the tool against the rim of the wheel.

The four circular feet of the tool are so narrow that the film of fluid between them and the surface of the wheel is rendered entirely negligible in thickness by the very high pressure under the feet.

All fluids used are heavily dyed so that nonuniformities that might appear will be readily detected by visual inspection. The dye also permits an operator to inspect the uniformity of transfer of the fluid to the paper specimens.

Measurement of Viscosity

In this study the viscosities are so high (of the order of a few kilopoises) that conventional methods are impractical. In particular, the time required for a flow of a reasonable amount of the fluid through a capillary tube becomes prohibitive. There is difficulty in handling a fluid of high viscosity—it does not pour in a reasonable length of time, and ordinary manipulations tend to introduce air bubbles in the fluid which, because of the high viscosity, remain suspended for a practically indefinite period of time. A method for measurement of viscosity was therefore sought which would have the following merits: (a) Low sensitivity to a few small air bubbles; (b) require a small sample and no pouring of the fluid; (c) simplicity and neatness of operation; and (d) good precision. A method satisfying these requirements quite well is that of the cup-and-ball viscometer *(3)*. A drawing of the instrument employed in this investigation is given in Fig. 6. It consists of a spherical cup C ground in a brass piece having a thermometer well for the bulb of a thermometer T. The ball is a 1-inch steel ball having appended to it a rod and weight W, the total weight of ball, rod, and weight being 858 grams. Three balls having nearly identical diameters were purchased. Two of these were used to grind the spherical cup to proper curvature (the first for coarse grinding following the original lathe work, and the second for the finishing operation). The cup is provided with three equally spaced studs (P) which limit the separation between the ball and cup to approximately 0.001 inch. The weight (W) may be disconnected, reducing the load by a factor of ten.

The viscous material to be tested is applied to the ball by inverting the ball-weight system and lowering the ball to contact the fluid. The ball is then pulled straight up slowly and, when the fluid has flowed to a uniform spot (by virtue of its surface tension), the ball is brought into contact with the cup. Because of the high viscosity, the ball does not come into contact with the studs at once. A strong spring serves to force the ball and cup together in an operation that requires a time equal roughly to u minutes, where u is the viscosity in kilopoises. When the ball support and spring are released, the ball system becomes suspended from the film of fluid. As the fluid moves from the peripheral excess toward the center of the film, the ball descends slowly until, at a fairly critical point, the ball system falls away rapidly. The time in seconds, measured by a stop watch, required for the

* Continued from last week.

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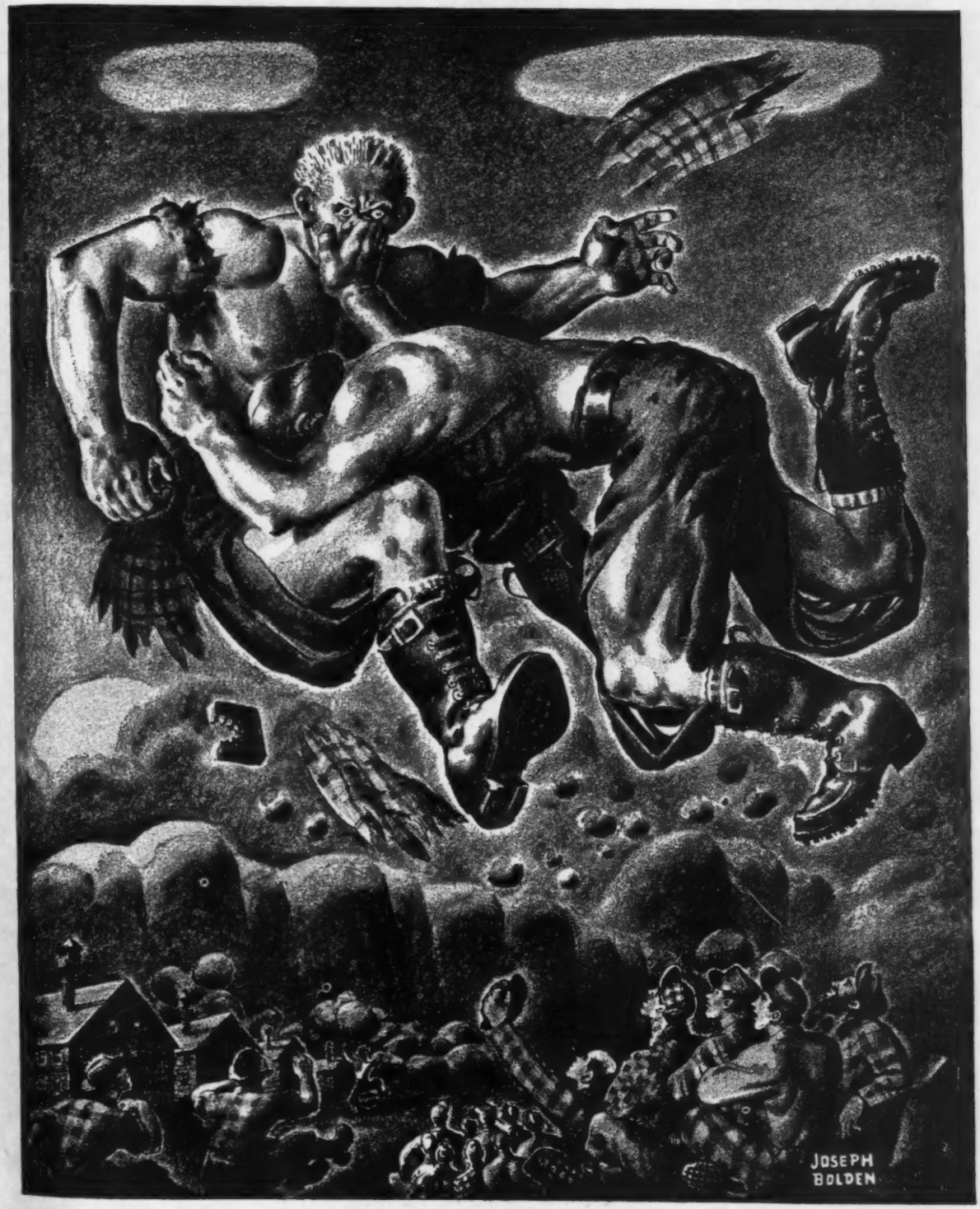

Hels Helson, the Big Swede, having eaten of the strong meat of authority, contested Paul Bunyan's leadership. Decisively defeated, he became the perfect and ideal foreman.

A reproduction of this incident from the fabulous life of Paul Bunyan—the twelfth of a series—will be sent on request. It will contain no advertising.

ball to fall free after its release from the spring clamping, is proportional to the viscosity *(3)*.

Calibration of the device using blown castor oil (Baker Castor Oil Company) carried out by means of the falling ball method is shown in Table II. The conditions obtaining in this work permit the accurate use of Stokes' law, which states that the viscous drag force on a sphere of radius a moved with velocity v through a fluid of viscosity u is $F = 6\pi uva$. This equation holds accurately only when the viscosity (expressed in poises) is appreciably larger than va when v and a are expressed, respectively, in cm./sec. and cm. *(4)*. In this work steel balls with a diameter of 0.475 cm. were used. The undyed fluids were placed in beakers and the times of transit of the slowly falling balls past predetermined levels were evaluated only after the balls had sunk appreciably below the fluid surface. Since a ball can be removed from the bottom of the container only with considerable difficulty, the balls were left on the bottom until several had fallen.

TABLE II.—CALIBRATION OF THE CUP-AND-BALL VISCOMETER

Viscosity	Blown Castor Oil	
	No. 30	No. 40
Falling ball method, kilopoises (u)	1.17	2.92
Cup-and-ball method, seconds (t)	55.0	134.3
Constant (u/t)	0.0213	0.0217
Average	0.0215	

In all cases, whether a fluid is employed in calibration or in actual bonding strength tests, it is subjected to vacuum treatment at slightly elevated temperature in order that substantially all air bubbles will be removed. This treatment is repeated at intervals because frequent removals of small amounts of the fluid by means of a spatula unavoidably introduces air bubbles. It is not believed that air bubbles have serious effect in either the actual test of bonding strength or in the cup-and-ball method of determining viscosity, and it may be that the precaution of removing air bubbles may be dispensed with after more experience with the method has been obtained.

Equation (4), giving viscosity from data obtained with the falling ball method, is presented for the reader's convenience:

$$u = 0.218\ a^2(d_s - d_f)\ t/h \text{ kilopoises}, \qquad (4)$$

where a is the radius of the balls in cm., d_s and d_f, respectively, the densities of the balls and fluid in

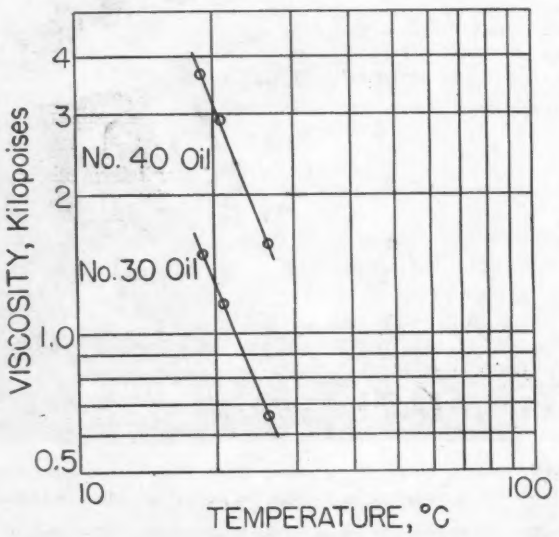

FIG. 7
Viscosity-Temperature Relationship for Blown Castor Oil

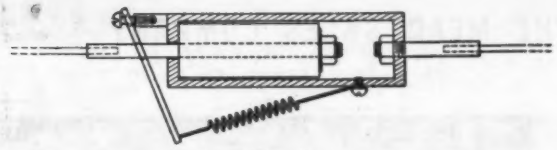

FIG. 8
Shock Absorber to Reduce Initial Force in Cable

g./cm.^{3}, and t the time in seconds required for the ball to fall through a distance of h cm.

VISCOSITY-TEMPERATURE RELATIONSHIP

The fractional decrease in viscosity per unit temperature increase is a quantity which is fairly substantial for nearly all liquids. In fact, a perusal of handbook data reveals that, for many liquids, this quantity falls within fairly narrow bounds, and typically amounts to about 10% per degree C. In the present study with the new apparatus, most work has been done with solutions of polyvinyl acetate in diethyl phthalate, chlorinated diphenyl, and blown castor oil. To date the last named fluid has proved most satisfactory and, hence, the most careful measurements have been made with blown castor oil. The variation of viscosity of this oil with temperature over a small range covering ordinary room temperatures is presented in Fig. 7. It will be noted that one should measure temperature to preferably within 0.2° C., and employ a chart like that given in the figure. As already mentioned, the temperature of the film is measured by means of a thermocouple pressed against the steel wheels at points near their rims.

MISCELLANEOUS COMMENTS CONCERNING APPARATUS

The high acceleration associated with high speed subjects the cable to forces sufficiently large either to break the cable (if somewhat worn) or to pull the cable from its connection with the rod A of Fig. 3. Such breakage has been almost eliminated by placing a shock absorber in the line between the shaft (5) and the pulley wheel (Fig. 2). This shock absorber should have the desirable feature of reducing the initial acceleration without having resilience—that is, it should hold itself in the compressed state without elastic return, for such return would give the wheels added impetus and, hence, irregular speed after the first phase of the shock is over. A shock absorber which accomplishes this is shown in Fig. 8. Soft rubber is used as the resilient medium. A simple hand operation releases the absorber from its compressed state, thereby placing it in condition for the next run.

When it is desired to discard the specimens, the heavy glass plates on which they are mounted are removed from the instrument and placed on a table against an abutment so that one or two strokes of a broad chisel will remove all of the paper and most of the adhesive. The remaining adhesive may be removed with a cloth dampened with a suitable solvent. (In work of this kind, where adhesive and oil film must be removed frequently, it is a good plan to tear or cut clean rags into many pieces about 4 inches square and discard these small squares after use. In this way the work is kept clean and neat.)

If the variable speed arrangement is not already equipped with a reliable scale, it is found convenient to attach to the device an indicator and scale which will permit one to set the speed at any desired value within fairly close limits. If predetermined speeds are not possible, time is wasted in the establishment of the critical speed. The motor driving the variable speed device is a single-phase induction motor rated at ¼

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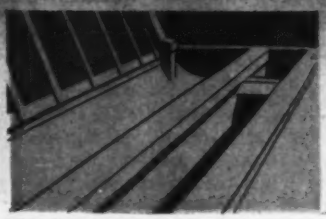

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hp. and 1750 r.p.m. Although there are a number of satisfactory variable speed devices available, any one of which would be suitable, it might be of interest to the reader to know that the one employed in the present apparatus is a size 3½—1 "Select-O-Speed" transmission operated with undersized V-belts to increase the total range of output speed.

Experimental

Procedure

The object of a determination is to find the critical speed—that is, the speed above which failure of the specimens definitely occurs, and below which failure does not occur. If, as is often the case, there is no exact information available concerning a given sample, the critical speed is most quickly arrived at by bracketing. First, a speed is employed which is judged to be somewhat lower than the critical speed, the basis of the judgment being general experience. Then a speed higher than the probable critical speed is used and, if failure occurs, the nature of the failure is inspected and an estimate of a suitable third speed is made. This process is continued and notes on the failures which are produced are made. A fair estimate of the critical speed can be made after a few speeds have been used. A typical determination is given in Table III. As will be shown later, the product *uv* is a measure of the bonding strength of the specimen. No name for this product is already at hand, and we therefore tentatively coin the designation, "viscosity-velocity product" (V.V.P.).

As a general rule, the earliest indication of failure is a blister, or series of blisters. These blisters may consist of merely coating alone, or the skin of the blister may consist of a combination of coating and body stock. If the V.V.P. is increased, the blisters become more extensive and, at a certain V.V.P., the rupture of the surface or of surface and body stock opens up and small bits of coating or a combination of coating and body stock leave the sheet and remain on the film carried by the wheels. The value of the V.V.P. at which the latter complete failure occurs has

TABLE III.—DETERMINATION OF CRITICAL SPEED FOR A COATED BOOK PAPER AND A VISCOSITY OF 1.10 KILOPOISES

Speed (cm./sec.)	Remarks	
	Left Specimen	Right Specimen
68	Blistered, no rupture	Blistered, no rupture
89	⅛ area ruptured	⅛ area ruptured
76	Very slight rupture	No rupture (but blistered)
78	Very slight rupture	Slight rupture along ½ distance
81	Slight rupture	Ruptured along ¾ distance
76*	Very slight rupture	Very slight rupture

uv = 84 kp. cm./sec.

* Taken as critical speed.

recently been taken as the critical value although much of the preliminary work was based on the first appearance of blisters. Recent observations have shown that the currently accepted critical value is sharper and more completely independent of personal estimation.

Preliminary Experiments

A considerable amount of work was done in the early phases of this work with viscous solutions of polyvinyl acetate in diethyl phthalate. Several series of experiments were carried out with the object of determining the influences on critical speed of viscosity, film thickness, and load. Although much of value was learned from this work and useful techniques were developed during this period, sources of error were later found and eliminated, thus making it impossible to form generalizations.

One such source of error was a small slippage between the accelerated wheels and the specimens. Slippage was at first estimated to be negligible. Later, however, certain vagaries appeared in the data and a number of factors were scrutinized very closely. Measurements on slip were carefully made and a small slippage was found. This source of error was removed by wiping the rims free of the viscous fluid over a distance of about two inches and orienting the wheels so that contact with the specimens would be made only with the clean portions of the rims. Tests then showed that the wheels attained terminal angular speed in a short distance of travel.

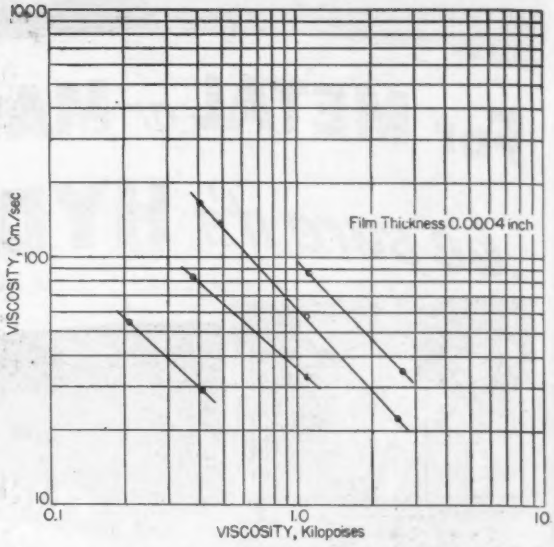


FIG. 9
Viscosity-Velocity Relationship for a Film Thickness of 0.0004 Inch

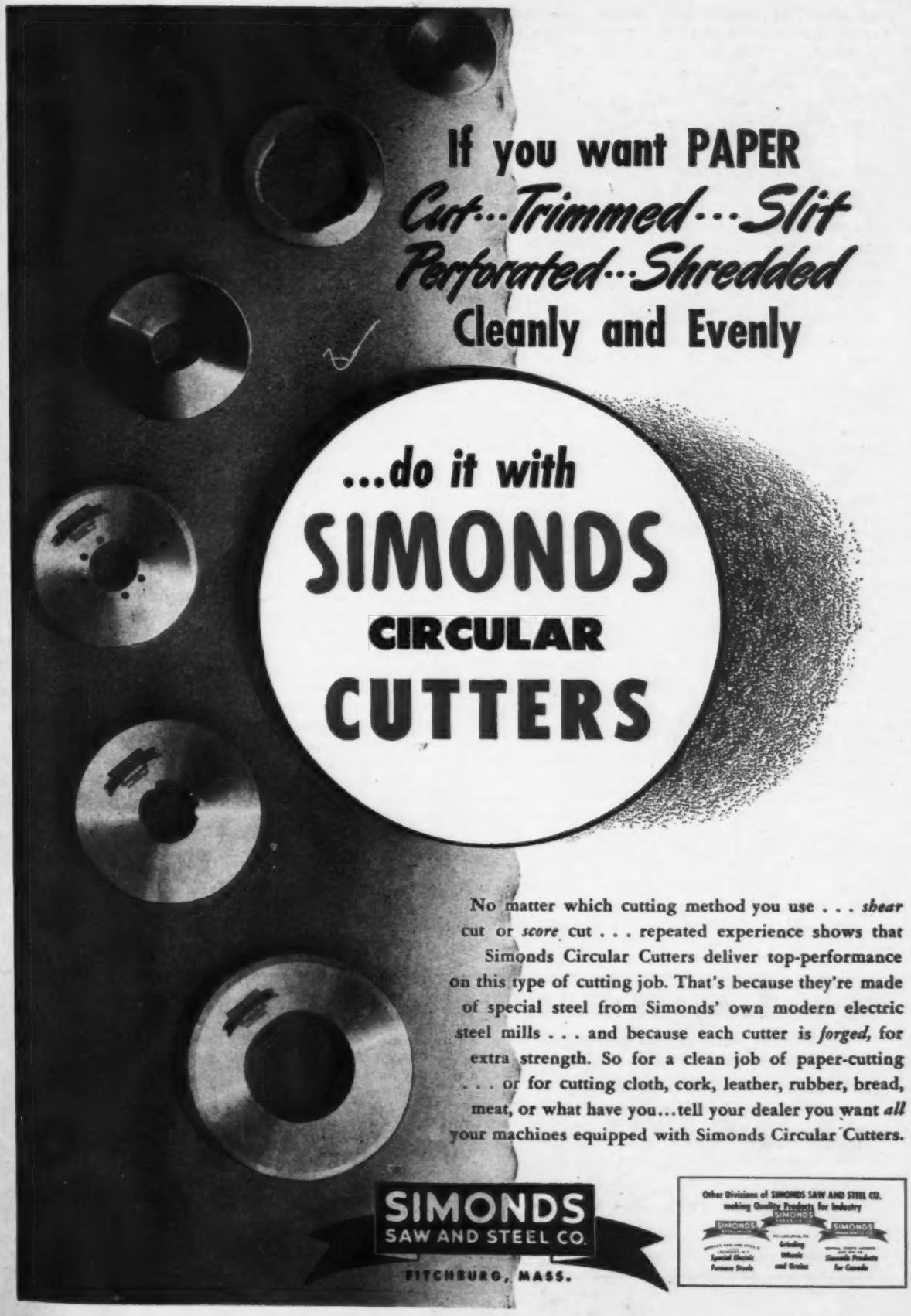
A further source of difficulties was found in the inherent characteristics of the solutions of polyvinyl acetate which were used in most of the preliminary work. There were indications that these solutions were not Newtonian for the rates of shear involved in this work and, in addition, a very peculiar phenomenon was observed when the specimen had high bonding strength: If the bonding strength was so high that speeds approaching 300 cm./sec. were necessary to produce rupture, *the rims carrying films of thickness up to and greater than 0.0015 inch would roll over the specimens without leaving a trace of film on the latter.* Still, in some cases, blistering was produced, so that the film had come into intimate contact with the surfaces of the specimens. The simplest explanation for this is that the tensile stresses in the film were greater than the adhesion strength between the specimen and fluid.

During the course of the early work it was found that the total load has some influence on critical speed, but was not a critical factor. A loading of 130 pound per inch has been found to be satisfactory and has been used in all recent work.

Blown castor oil prepared by the Baker Castor Oil Company has been employed in all the later work.

Viscosities of Blown Castor Oil

Data on the viscosities of the oils used in recent work are given in Table IV, and a chart giving the variation of viscosity with temperature is presented in Fig. 7. As previously mentioned, a viscosity-temperature chart is employed in the work and temperatures are measured with an accuracy within 0.2° C. The error in viscosity associated with an uncertainty



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of 0.2° C. is about 2.5%. When viscosity is to be checked by the use of the cup-and-ball method, at least five, and preferably ten, determinations are made. Two determinations involving ten individual measurments each are presented in Table V. It will be seen that ten determinations give an average having a probable error well under 1% (the probable error in the average of five determinations would be of the order of 1%).

TABLE IV.—VISCOSITIES OF BLOWN CASTOR OIL AT 21° C.
(Cup-and-ball method)

Designation of Oil	Viscosity (kilopoises)
1000 pale oil	0.28
No. 15 oil	0.44
No. 30 oil	1.20
No. 40 oil	2.66

Viscosity-Velocity Relationship

Since it is difficult to maintain viscous solutions at a given constant value and because a range of viscosities is desirable in view of the fairly large range of bonding strengths encountered in different papers, it is necessary to know the relationship between viscosity and velocity for a constant bonding strength and, more generally, the relationship between bonding strength and these two quantities.

TABLE V.—PRECISION OF VISCOSITY DETERMINATION WITH THE CUP-AND-BALL VISCOMETER

No. 30 Oil Time, sec.	No. 40 Oil Time, sec.
54.9	139.2
53.8	126.5
51.5	133.5
56.4	130.5
55.4	145.0
53.2	128.2
57.1	132.6
55.8	140.0
55.6	132.2
56.7	135.6
Mean: 55.0 sec.	Mean: 134.3 sec.
Probable error in mean: 0.63%	Probable error in mean: 0.85%
Probable error in individual value: 2.0%	Probable error in individual value: 2.7%
u = 1.18 kp.	u = 2.88 kp.

This problem was attacked through the careful determination of critical speeds for four special coated papers representing a wide range in bonding strength and four oils of viscosity covering a twelve-fold range. The papers were samples designated as Book 94780, 81, 82, and 83, the coatings containing 10, 14, 18, and 22% casein. As previously described, the critical velocity was determined by observing the results of passage of the wheels over pairs of specimens at different speeds. The data obtained for these samples are presented in Table VI and in Figs. 9 and 10. Measurements of the slopes of the curves of Figs. 9 and 10 show that, for a film thickness of 0.00040 inch, the viscosity-velocity relationship is given by

$$uv^{1.62} = \text{constant},$$

for constant bonding strength and that, when the film thickness is 0.00080 inch, the relationship is

$$uv^{1.06} = \text{constant}.$$

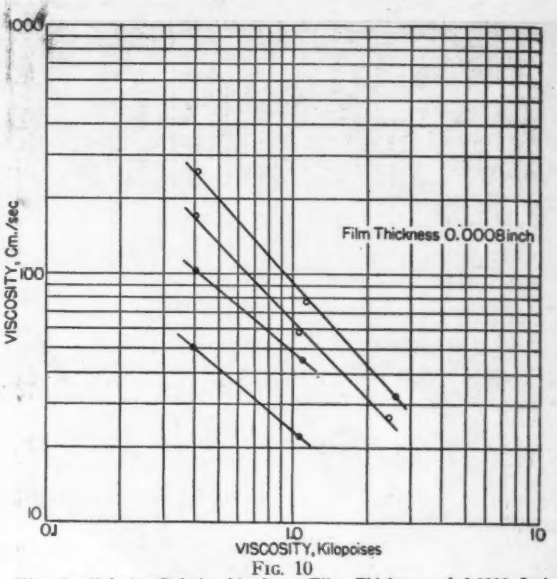

FIG. 10
Viscosity-Velocity Relationship for a Film Thickness of 0.0008 Inch

On the assumption that the film thickness does not vary appreciably with speed when the load is held constant, one would expect that the tensile stress in the fluid should be proportional to the product uv, provided, of course, that the fluid is Newtonian. This follows from the consideration that, in a Newtonian fluid, stresses are proportional to rate of shear—i.e., for a given geometrical configuration, the stresses are proportional to the velocity. Since the relationship

$$uv^{1.04} = \text{constant},$$

for constant bonding strength agrees within experimental error with the anticipated more general expression, (bonding strength) = constant uv, it is assumed that the correct exponent for the speed is unity. There is no doubt whatever that the tensile stress in the fluid acting to disrupt the specimen increases with uv (or V.V.P.) and, hence, the V.V.P. might be taken as a measure of the bonding strength. In the absence of a rigorous mathematical treatment relating the tensile stress with V.V.P., the latter quantity itself is taken to express the bonding

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strength. In terms of this quantity, it will be seen from the data of Table VI that the bonding strengths of the samples representing a variation in casein content from 10 to 22% vary from about 12 to 95 kp. cm./sec.

The Effect of Film Thickness

It is simpler to control film thickness accurately when the thickness is larger and, hence, much of the earlier work was done with film thicknesses of the order of 0.0015 inch. Recently, however, definite evidence has been found showing that the theoretically expected direct proportionality between bonding strength and V.V.P. does not obtain unless the film thickness is adequately small. Data on the relationship between V.V.P. and casein content (from Table VI)

TABLE VI.—VISCOSITY-VELOCITY RELATIONSHIP

Sample	Casein Content, %	0.0004-inch Film Oil	u	v	V.V.P. (uv)	0.0008-inch Film Oil	u	v	V.V.P. (uv)
B 94780	10	1000 Pale	0.209	54.4	11	No. 15	0.393	50.3	20
		No. 15	0.413	28.9	12	No. 30	1.06	22.3	24
B 94781	14	No. 15	0.38	83.2	32	No. 15	0.402	103	41
		No. 30	1.09	32.9	36	No. 30	1.09	45.1	49
B 94782	18	No. 15	0.404	165	67	No. 15	0.404	170	69
		No. 30	1.09	57.5	63	No. 30	1.06	58.1	62
		No. 40	2.55	22.3	57	No. 40	2.46	26.6	65
B 94783	22	No. 30	1.12	86.0	96	No. 15	0.413	258	107
		No. 40	2.66	34.9	93	No. 30	1.13	77.3	87
		.....	...	...	..	No. 40	2.60	32.4	84

are plotted in Fig. 11 for 0.0004 and 0.0008-inch film thicknesses. Also given are data for a film thickness of 0.002 inch. At the latter film thickness, samples containing 10, 14, and 18% casein had about the same V.V.P. Moreover, all failures at this thickness of film were *body stock* failures. When the film thickness was reduced to 0.0008 inch, an interesting change took place, and the V.V.P. varied with casein content in a manner more like that to be expected. Similarly, when the film thickness was 0.0004 inch, the expected relationship was obtained, and it appeared that the latter thickness was closer to that for which the change in the effect of film thickness is complete. At both the smaller thicknesses, all failures were in the body stock with the exception of the sample having a coating containing 10% casein, in which case only the coating was removed. There are at least three inferences to be drawn from these observations:

First, using small film thickness, there is a definite and strong variation of V.V.P. with casein content and, hence, it would appear that the new test would be of practical value.

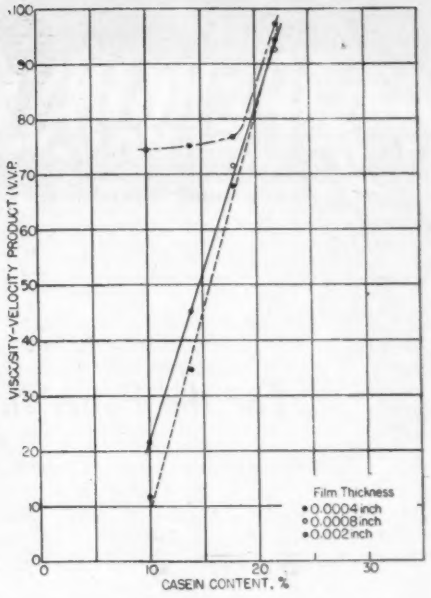

Fig. 11
Relationship Between V.V.P. and Casein Content of the Coating

Second, the absence of coating failure at low casein content where a large film thickness is used would imply that a thicker film, producing a more general contact and more uniform distribution of tensile stress in the fluid over the surface, tends to produce a more general failure, whereas a thin film comes into contact with the surface more spottily, thus giving rise to localized stress intensifications which tend to favor the removal of surface layers. This carries the implication that the bond between coating and body stock is at least as strong as the internal bonding in the body stock (for the base stock involved in this work) *when localized stress intensifications are avoided.* This possibility is of importance in view of the fact that, in printing, the printing areas vary considerably and, therefore, the degree of localization of stresses also varies considerably.

Third, although the sample containing 10% casein exhibited coating failure when the thin film thicknesses were used and the other samples failed in the body stock, the points for this sample fell upon the same curves as those for the other samples. This lends strong support to the idea that one cannot draw a sharp line between the coating and base stock, but that

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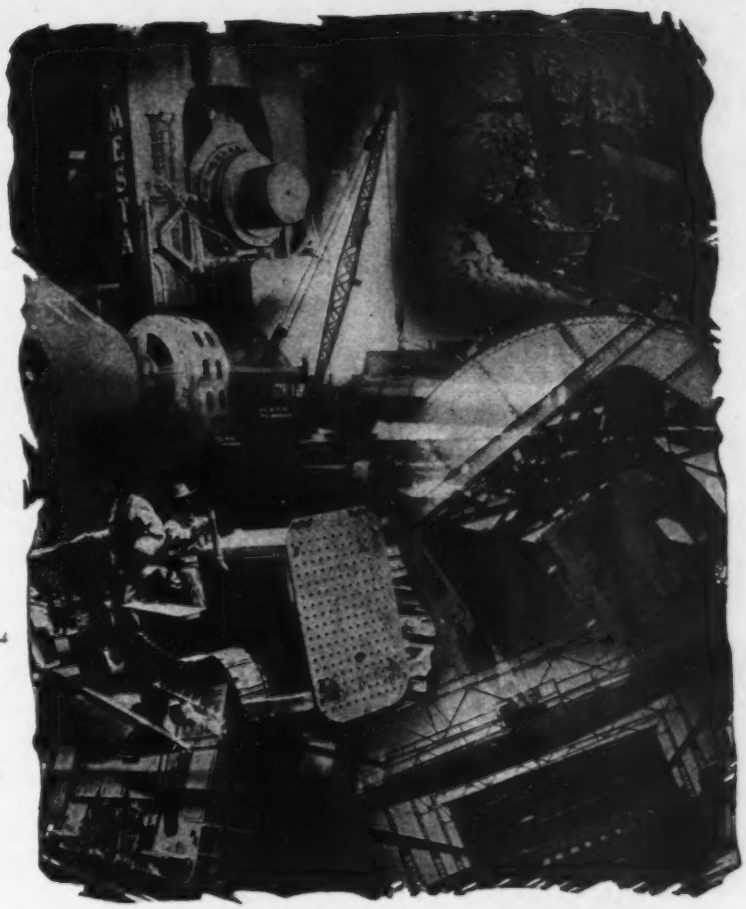

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the coating system penetrates into the body stock during the coating operation, thereby causing a gradual transition from fiber to coating. The gradualness of the transition and the strength of bond are undoubtedly important in studies of such defects of coated papers as the tendency to "strip" when the bond between coating and base stock is weak and the transition between the base stock and coating sudden.

Two very desirable features of the use of thin films are (a) generally better simulation of printing conditions, and (b) lower operating speeds. Although further work should be done on the effects of film thickness, it is felt that a thickness of 0.0004 inch should be adopted for general work until a more suitable thickness is indicated.

Future Work

Further work on the method described in this report should preferably follow along these lines:

1. Adaptability of the method to the testing of bonding of papers generally should be explored. In particular, the bonding between plies of paperboard should be studied (in comparison with established methods), and the bonding in writing papers should be investigated with the view of possibly arriving at a strength index of interest in connection with resistance to abrasion and erasure. "Erasability" is a complex property depending on many different factors, among which is internal bonding strength.

2. Tests on book papers, both coated and uncoated, should be made with the view of correlating the instrumental data with information regarding the performance of the paper in offset and other printing operations where mechanical failure of the paper in the form of "picking" presents a problem. During this work, the wax pick test should be performed simultaneously so that further information regarding the usefulness and limitations of the wax pick test may be studied.

3. During the course of work on the foregoing, further tests may be directed toward a more complete understanding of such variables of the method as film thickness, load, and the viscous fluid. It is believed that further fundamental work should be done using additional commercial paper samples covering a wide range in bonding strength and surface smoothness.

An appeal is made to the industry to supply paper samples which have mechanically failed (by "picking") in printing, together with samples of similar kind which were judged satisfactory under virtually the same conditions of printing speed, pressure, ink tackiness, etc.

Addendum

The attention of the reader is directed to the more feasible design of apparatus briefly referred to in the first paragraph of the sub-section entitled "The Instrument," in the section on "Apparatus." In the rotary design, the axis of the wheels bearing the thin films of a viscous medium would be stationary, and the paper specimens would move on the periphery of a rotatable drum, to which they would be bonded with the "3-M" Minnesota Mining Trim Cement. By means of any one of a number of methods, the pair of wheels could be made to bear on the paper specimens with a definite force produced either by a calibrated spring or by weights. If the drum were accelerated from rest to a speed greater than that corresponding to the critical speed by means of a mechanism which would increase the speed in a predetermined manner, the critical speed could be determined in a single run; it would only be necessary to note the positions on the specimens at which rupture began and then, from a chart relating speed with peripheral position on the drum, the critical speeds could be recorded. This method would eliminate the time-consuming process of determining the critical speed by gradual approach from high and low speeds. Any one of several mechanical devices could be employed for accelerating the drum in a predetermined manner. One that suggests itself as rugged and practical is a properly shaped cam linking the drum through a rack and pinion. In order that inertial forces may be minimized, the drum should be designed to have minimum weight consistent with good strength; aluminum or magnesium alloy would be a suitable material of construction. In view of the fact that the moment of inertia of a drum varies approximately as the square of the diameter, the drum should not be large. A further advantage of a small drum is that it does not require a long specimen. It is proposed that the drum have a diameter of the order of 4 or 5 inches.

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TAPPI Notes

The TAPPI Lake States Section will meet at the American Legion Clubhouse, Appleton, Wis., at 6:30 p.m., November 12th. Joseph Rossman of the Marathon Corporation will talk on "Current Patent Trends and Problems Affecting the Paper Industry."

Edward J. Schroer, chief chemist at the Cincinnati mill of the Container Corporation of America, has been transferred to Carton de Colombia, Cali, Colombia.

Floyd W. Nienow, formerly of the Pennsylvania Salt Mfg. Company, is now with the War Paper Company, Merrill, Wis.

J. B. Michon, formerly with Cellulose du Pin, is now managing director for Cie. Nord Africaine de Cellulose, Paris, France. This company is erecting an esparto mill in Algeria.

William T. Webster, formerly of Brunswick Pulp & Paper Company, is now assistant general manager for the National Container Corporation, Jacksonville, Fla. Prior to leaving Brunswick, Mr. Webster was presented with a handsome watch by the members of the local Unions.

Francis R. Desmond, formerly of the Claremont Paper Company, is now chemist for the Merrimac Paper Company, Lawrence, Mass.

Tsong-Chi Sheng, formerly of the U. S. Forest Products Laboratory, is now assistant profesor at the University of Nanking, China.

Lester Kirschbraun, formerly research director for the Flintkote Company, has retired but will continue as a consultant for the Pioneer-Flintkote Company, in Los Angeles, Cal.

Russell J. LeRoux, formerly of the Rhinelander Paper Company, is now mill manager for the Pulp Division, Weyerhaeuser Timber Company, Everett, Wash.

William S. Grimes, formerly with the Orchard Paper Company, is now chemical engineer for the Ahdawagam Paper Products Company, Wisconsin Rapids, Wis.

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PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

W. L. Cook, Editor

Problems Still Ahead

With the political air in a fair way to be cleared up of some of its most recent confusions, the pulp and paper industry, as part of the entire industrial picture, now finds itself able to devote its whole attention to the long train of other problems that remain to be tackled and solved.

OPA, it is generally assumed, will shortly pass into history, and with it, if not before it goes, will pass the stifling effect of controls which it exerted. The pertinence and effectiveness of these controls during the war need not be appraised here. The choking influence of depriving an industry of its raw materials through controlling the prices at which it may buy them has become more and more distressing with the surge of demand that has accompanied nominal cessation of the war, though actual peace has not yet been declared.

Pulp and more pulp is needed. Above the ability of nearby sources to provide enough pulp, the market at present offers little, and that because foreign sources are disposed to continue their cultivation of contacts that have existed long. They can command higher prices elsewhere. Ceiling prices here make this market at present less than attractive.

Decontrol of prices on finished paper is needed. It should be possible for a mill to make and sell, at a fair profit, the types of paper for which it came, before the war, to be relied on as a source of reliable supply. Of late, with politically favored wage scales that have eaten heavily into the margin that some prices have offered, the mills have had no choice other than to seek higher priced varieties that they could manufacture, or to continue their former lines at a loss.

These are but two of the urgent needs of this industry, and when they are attained other problems will follow in pressing volume. Every man in the industry knows some of them, and he knows that only the first step has been taken to meet them, now that the election is over. But already there is a feeling indicated that at least the industry is shortly to be in a position to grapple with its production and trade relations problems without longer need to consult and defer to artificial impediments.

A long list could be made of these problems. For instance, Robert Porter, of Wilcox-Walter-Furlong in Washington, a merchant who knows paper from its source, puts his finger on shortage of pulp and government directives as twin causes of market congestion. Declaring that the paper market for the fourth quarter will be in a much worse position than it has been during any time this year he finds the great percentage of the troublesome problem may be attributed to the inability of a good many of the mills to secure sufficient pulp. It is apparent, under the OPA price allowed to Scandinavian pulp mills, that we will receive very little pulp from abroad. Some sources question whether the decontrol of pulp in the paper industry would be the answer. However, it would seem to be far the better policy immediately to decontrol the industry. It is a fact that an industry is not to be decontrolled until supply and demand are in balance, but the continuance of control is definitely not correcting the condition. With decontrol, there would probably be a hectic market for a few weeks. Then it would level itself. It is difficult to understand how a number of converter mills will be able to continue on a five-day basis for the rest of the year, or whether some of them will have to shut down temporarily.

Directives which have been placed upon the mills during the last five or six weeks to cover government requirements, have definitely affected their sales and deliveries to the merchant trade, which necessarily reverts back to the printer or ultimate buyer of printed matter. If the CPA is to come back into the picture on an active basis as a controlling factor along with OPA, then who is to see who is going to get what and how much? Under controls, we are certainly headed for a much more stormy set than we have experienced in the first nine months of this year.

The hope for better conditions in the outlook for kraft paper has gone the way of many recent hopes. It appears impossible to satisfy the demand for all kinds of paper, but probably kraft paper is one of the most difficult items to obtain in industry today. A great many factors combine to make this condition.

What would happen if labor in many industries settled down and really went to work? It is probable that the paper industry would find itself in a much worse predicament and there would be more companies reporting shortages of kraft paper until such time as new production begins to roll into the market.

The supply of waste paper has improved very considerably. Some board mills even have a fair stock of pulp on hand but, running twenty-four hours a day seven days a week, they are unable to catch up with the tremendous demand that is coming from every direction. Operators of carton plants who do not own board mills, have had to run short time and

Calendar of Coming Events

November 7-8, 1946—National Paperboard Association Annual Meeting, The Waldorf-Astoria, New York City.

many folding and set-up box plants have had to shut down for days at a time because of their inability to obtain supplies of board.

Purchasing agents, who, heretofore, have been able to get limited carton supplies have had to go out and literally beg for dribs and drabs of cartons so that their company's goods could be packaged. Many companies are bulk packing a large portion of their production. Probably never before in the history of the paper industry have paper and paper products been so much in demand and in such a short supply position as at the present time. There does not appear to be any possible improvement for several months.

New production is being held up because of inability to get parts of equipment or labor to assemble and install equipment, and until this new equipment is operating and the supply figure is considerably raised, it is doubtful if there will be any improvement whatever in the situation.

The fine paper market according to a recent survey by the National Association of Purchasing Agents, continues to deteriorate. Beset by aggravated pulp uncertainties and a multitude of other things upon which they are dependent but over which they have no control, the market staggers on from day to day.

It seems to this authority that any immediate relief can only come by reduction in demand, not only reduction in demand for fine papers but reduction in demand for all papers. There is reason to believe that stocks in printers' and publishers' inventories have very substantially increased over January 1, 1946, totals. While not excessive for today's planned operations or prospects, they could become quite large with a reduction in demand from their customers or a business recession of some degree.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1946		Corresponding Weeks—1945	
September 21	105.8	September 22	94.3
September 28	106.6	September 29	98.1
October 5	107.2	October 6	94.1
October 12	105.9	October 13	96.2
October 19	105.1	October 20	96.5
October 26	*106.8*	October 27	95.8

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	88.6	90.2	95.9	95.5	91.0	89.7
1946	94.7	98.4	104.4	102.7	100.7	104.6	94.0	104.7	*101.3*				

COMPARATIVE YEARLY SUMMARIES

	1939	1940	1941	1942	1943	1944	1945	1946
Year to Date	81.3	86.1	96.2	92.0	88.5	88.3	88.9	*101.0*
Year Average	83.4	85.6	97.4	90.4	87.8	88.1	89.7	

*Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Current Weeks—1946		Corresponding Weeks—1945	
September 21	100	September 22	93
September 28	101	September 29	96
October 5	100	October 6	95
October 12	99	October 13	97
October 19	98	October 20	96
October 26	*101*	October 27	98

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Av.
1945	91	95	97	97	96	96	86	90	91	97	95	85	93
1946	90	97	100	99	94	97	89	99	96				

†Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

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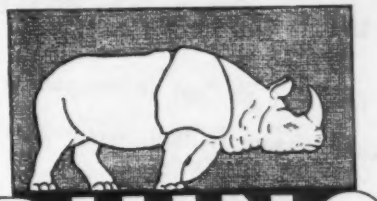

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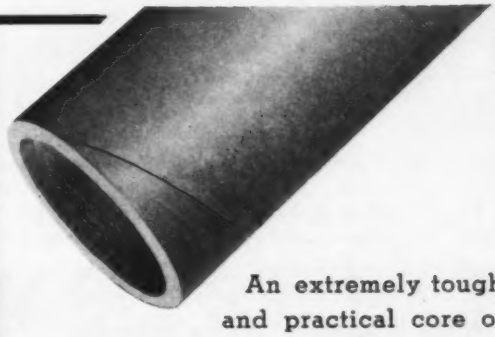

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Water Requirements of Industry*

By Lewis B . Miller[1]

Abstract

A brief discussion is presented of the process water quality requirements for various types of industry with the objective of emphasizing the importance of providing water suitable in character for each industrial process.

From the early beginnings the promoters of those types of industrial ventures which require substantial quantities of water for their operating processes have recognized the fact that such process waters must possess certain quality characteristics, albeit the knowledge available regarding these requirements was usually vague and indefinite. The recognition of this fact, crude as it may have been in early industrial history, has influenced the geographical location of certain industries in those areas where an abundance of water of suitable quality was available. With the growth of population and the development of industry in the United States the streams and other surface waters have deteriorated in character because of the discharge to them of increasing quantities of sanitary sewage and industrial wastes; the denudation of the soil which increases the amounts of suspended solids carried by streams, particularly during times of flood; and which in itself increases the intensity of the flood stages of streams; and various other factors which cannot be appropriately discussed at this time. At the same time that raw water for process purposes has deteriorated in quality, manufacturers have been faced with the production of manufactured materials of higher quality and to more exacting specifications. Gradually, therefore, industry is coming to recognize the importance of having process water, as one of its important raw materials, meet certain minimum standards, such as is required for the other raw materials used in its manufacturing operations.

Water for Industry

Appreciation of the necessity for using water of a quality suitable to a given manufacturing operation is far from being universal. It is the rule rather than the exception to find manufacturers purchasing raw-materials of finer quality and at higher cost, or altering their manufacturing operations at considerable expense, in an effort to minimize operating difficulties or improve finished products, where the fundamental problem is one of inadequate process water quality. In very many cases there is no clear understanding by the manufacturer of just what constitutes desirable water quality for his particular manufacturing processes.

In an effort to solve this problem of water quality requirement for the pulp and paper industry, the Water Committee of the Technical Association of the Pulp and Paper Industry (of which committee the author is chairman) is making an intensive study of the quality requirement for the several general types of pulp and paper. Several types of paper have been investigated by the committee and, as rapidly as the information obtained will permit, specifications are being developed for the guidance of the industry in selecting and providing suitable process waters for its manufacturing purposes. In a professional capacity as a consulting engineer the author's time is largely consumed in the design and installation of water treatment plants to provide suitable water for industrial processes and in the design of industrial waste treatment plants which have as an ultimate objective procuring for the industries and communities further down stream raw water of improved quality for process and potable usage. Under the circumstances it may be that a brief summary of the water quality requirements for different industries, with an even more brief discussion of the reasons therefore, drawn from the experience of the writer and from the studies of the TAPPI Water Committee, will serve to assist in emphasizing the importance of providing water of suitable characteristics for industrial usage. It should be emphasized that, in the following discussion, the time available will not in most cases permit a complete presentation of a specification for the process water quality required by each industry considered here but a brief discussion will assist in emphasizing the importance of this subject.

Water Quality Requirements for Fine Paper Manufacture

For several years the TAPPI Water Committee investigated this subject and presented its findings in the form of reports and technical articles to the pulp and paper industry *(1, 2, 3, 4, 5, 6)*. This committee work resulted in the preparation of a specification for the use of the paper industry *(7)*; most of the

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 25-28, 1946.
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essential portions of this specification are as follows:

TABLE I.—RECOMMENDED WATER QUALITY FOR FINE PAPER MANUFACTURE (FROM TAPPI TENTATIVE STANDARD E 600 S-44)

Substance	Permissible Upper Limits in Parts Per Million (p.p.m.)
Turbidity as SiO_2	10.00
Color in platinum units	5.00
Total hardness as $CaCO_3$	100.00
Calcium hardness as $CaCO_3$	50.00
Alkalinity to methyl orange as $CaCO_3$	75.00
Iron as Fe	0.1
Manganese as Mn	0.05
Residual chlorine as Cl_2	2.00
Silica (soluble) as SiO_2	20.00
Total dissolved solids	200.00
Free carbon dioxide as CO_2	10.00

Control of these several inorganic constituents is important for the following reasons: Turbidity causes a loss of brightness and affects the color of the finished paper. Color in water affects the color of the resultant paper. Hardness consumes sizing materials and alum, and may cause scale formation at various points, particularly on the "wire" where the paper is being formed. Alkalinity consumes alum and may lead to undesirable foaming, causing pin-holes in the finished paper. Iron and manganese, present even in minute amounts, cause discoloration of the paper and possibly stains and spots. Soluble silica in sufficient concentrations causes "tinniness" in paper. Total dissolved solids may affect paper manufacturing operations and paper products in a variety of ways. (See ref. *5*). It should also be pointed out that the presence of certain combinations of constituents in process water enhance the deleterious effects of each other so that the combinations are worse than the individual constituents alone.

Water Quality Requirements for the Cotton Textile Industry

The cotton textile industry uses the same two primary constituents in its manufacturing operations as does the paper industry, namely, cellulose and process water. It will be anticipated that textile manufacture will require water of similar quality to that used in fine paper manufacture and, within limits, this is the case. Additional processes, such as dyeing, require water of very high quality and such process water must be very low in hardness, iron and manganese, and heavy metals *(8)*.

Water Quality Requirements for the Rayon Industry

Through hard experience the rayon industry learned early in its development that high purity water was an essential to the successful and economic production of rayon fiber. In the early history of this industry suitable methods of water treatment were not available, as they are now, for effectively removing certain impurities from water so that the development of rayon manufacture had many difficulties to overcome because of poor quality process water and it is to the credit of the men responsible for the growth of this industry that they possessed the courage and tenacity to see the development through to a successful conclusion.

The rayon industry requires a very soft water of high purity. The manufacture of certain types of rayon yarn is particularly sensitive to the presence of heavy metals in the process water *(9)*. It should be added parenthetically that the manufacture of rayon, textiles in general, and paper are all affected by microbiological growths, giving rise to slimes, scales, corrosion, etc. in the water systems and the control of such growths is an essential part of the manufacturing operations.

Process Water for Secondary Petroleum Recovery

It is an approximate truth to state that when oil wells are drilled into an oil producing stratum, one-third of the underground oil may be removed by direct pumping, an additional one-third may be recovered by secondary means, such as injecting gases or water into the oil vein under high pressure by appropriate methods, and the final one-third is non-recoverable by methods known to date. Where "water flooding" is resorted to as a means of secondary recovery, the water must be of such quality that it will not plug the microporosity of the oil containing rocks, thus preventing further injection of water and recovery of oil. The water must, consequently, be free of turbidity. It must not form solid reaction products. Microbiological growths of certain types may have such an effect. Prevention of the plugging of the porous rock and removal of plugging deposits which have already formed are the field of activity for the combined efforts of the water specialist and the pertoleum engineer.

Water for Steam Production

This is a field in which engineers are far more water-conscious than in most fields of industrial water usage. So much has been written on this subject and it is such a complex one that it would be out of place to endeavor to discuss the subject further here, other than to point out the importance of water quality in steam production and its increasing importance as steam pressures and operating rates increase in the new boiler installations.

Water Quality in Cooling Waters

Many industries utilize cooling waters to a greater or less degree. The troubles arising therein, and in the use of water in the related field of air conditioning, are many and varied. A stable water (a water neither scale forming nor corrosive) is desirable and this is normally determined by an analysis of the water and a calculation based upon the Langelier equation. Treatment of the water to render it suitable for cooling purposes is based upon intricate calculations including considerations of temperature, the particular uses involved and the equipment available, costs of treatment, means available for recooling of the water where recycling is utilized, odor elimination where air conditioning is involved, stability of the water, control of microbiological growths, etc. External treatment of the water before using it for cooling purposes may be desirable and economical. Treatment within the cooling system is generally necessary. Several excellent discussions of this subject have recently appeared *(10, 11, 12, 13)*.

Water Quality for Laundering

Laundries require water somewhat similar to textile mills. Some of the more objectionable constituents of process water are heavy metals, iron and manganese, hardness, color, and turbidity.

Water for Brewing and Distilling

A water low in alkalinity and substantially neutral in reaction is desirable. The water should be as nearly sterile as possible and suitable for potable purposes. Water containing much organic matter may create a musty taste and precipitation during storage. Iron and manganese must be low since they produce color and sometimes off-tastes with tannins. Some calcium sulphate and minor growth-producing sub-

stances are desirable for the best yeast development. Chlorine residuals must be eliminated.

WATER FOR THE FOOD INDUSTRIES

The water must conform to drinking water standards. In general it should be soft, free from taste or odor, and low in manganese and iron. For baking purposes the water should contain some calcium sulphate, although it is probably preferable to add this constituent to soft water along with certain minor constituents, which in combination with calcium sulphate, are effective as yeast foods.

The above will serve as examples of the varied and highly specific water quality requirements of different industries. Carbonated beverage production, tanning, artificial ice manufacture, pharmaceuticals manufacture, and many others might be added, each having water quality requirements as peculiar to its needs as those cited above, and each requirement is based upon the technology of the particular industry. As stated in a previous paragraph, some of the industries know their water needs, many and probably most industries do not or are only now learning them. It is the objective of the present paper to point out a few of the special needs of industry in this respect and to emphasize the importance of the subject.

Fortunately the developments in the art and science of water treatment are keeping pace with the needs of industry for waters of specific, uniform, and well controlled quality. Within limits, it is now possible to provide water of almost any reasonable quality from raw waters of the most diverse characteristics.

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Elastic Gasket for Densometers

The TAPPI method of test for the air resistance of paper requires the use of an instrument in which air is forced through a standard area of a paper sample and the time noted for the passage of from 50 to 400 cc. of air.

The specification has recently been changed to require that an elastic gasket be placed on the clamping plate next to the source of air pressure. W. and L. E. Gurley, manufacturers of the Densometer, announce that existing instruments may be modified to have a gasket added to their clamping plates. The closed top Densometer requires a new top clamp plate which the user can substitute for the plate originally furnished. Open top Densometers require a new cylinder top or lower clamp plate and the inner cylinder must be returned to the factory for making the change. Gurley-Hill S.P.S. Testers can meet the new standard by obtaining an adapter plate equipped with gaskets which slips over the standard upper clamp plate.

The price of upper clamping plates is $12.50 each, cylinder tops are $17.50 and adapter plates are $10.00.

The use of the gasket makes possible more accurate tests, especially on rough or uneven paper. It also makes possible much better agreement between Densometers of different models.

Chemical Science and Industry

The Chemical Publishing Company has recently issued a book entitled "What Industry Owes to Chemical Science" (371 pp.). This is in fact a symposium in which 53 authors participated on behalf of the Royal Institute of Chemistry (England). Today, hardly any important industrial undertaking can be successful without a staff of technically trained men. Even small plants usually have at least one man who is technically qualified or employs the services of a consultant from time to time.

Included in the coverage are chapters on agriculture, foods, water supplies, pharmaceuticals, soaps, dyestuffs, bleaches, textiles, cellulose, pulp and paper, plastics, paints, coal, chemicals, building materials, and transportation. The chapter on pulp and paper was prepared by Julius Grant of England who traces the development of the industry from its early days.

Although the authors are all highly qualified technical men their presentation is essentially for the layman and a good cross-section is given of the contribution of chemical science to the major industries.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $5.00 per copy.

Personality and English for Technical Men

D. Van Nostrand, Inc. recently published "Personality and English in Technical Personnel," by Philip B. McDonald of the College of Engineering, New York University (424 pp.). This book, as noted, really covers two major subjects. Although the part devoted to personality factors may be considered to be controversial and would be presented quite differently by a technically trained man with a number of years of practical experience in an industrial organization, it is very interesting and would apply to anyone in business or industry. The author deals with maximum qualification rather than the optimum which is the most that can be expected of anyone who has to deal with a number of individuals of various personalities. The chapters dealing with English and writing are unusually good, and if read, will profit the reader greatly since it is through writing and talking that an individual has the best opportunity to sell himself and his ideas.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $3.75 per copy.

†The Rapid Measurement of an Index of Fiber Length*

Part I Description of the Test Method

By R. de Montigny[1] and P. Zborowski[2]

Abstract

A pulp testing method is described whereby a dilute aqueous suspension of fibers is made to flow past a set of fixed vertical blades under standardized conditions. The fibers caught by the blades are collected and weighed. This weight provides an index of fiber length. The apparatus and experimental techniques are described in detail and the factors which affect the results obtained are examined. The method is sufficiently simple, rapid, and precise for routine work.

A theoretical analysis of the mechanism of the method is presented as well as data supporting the conclusion that the index is a function of the average by weight of the square root of the fiber length. These data also show that the index is very sensitive to changes in fiber length but indicate that the relation between the index and fiber length, as calculated from Johnston Classifier data, is different for different types of pulps.

The present investigation arose out of the authors' dissatisfaction, which appears to be widely shared, with the tools at present at the disposal of paper mill operators to guide them in preparation of stock and in the rapid evaluation of stock quality. These tools at the present time are limited to a variety of instruments primarily designed to measure drainage characteristics and useful in allowing an estimate of stock quality only inasmuch as the stock has been prepared under conditions much more constant and accurately controlled than is possible in most fine paper mills today. It is common knowledge that the preparation of successive batches of stock to a constant drainage measurement figure is not an infallible guarantee of unvarying quality of the stock as gauged by the properties of the paper made from it.

The authors felt that supplementing such drainage measurements with a rapidly determinable quantitative index of fiber length would materially assist operators in controlling stock preparation.

Present methods for estimating fiber length fall into two categories, optical and mechanical. Both are open to the objection that the time required to carry out measurements is much too long to make them of any use for routine control. Optical, that is microscopic, methods are subject to the further criticism that the evaluation of a *weight* average fiber length involves the making of assumptions concerning the relationship between fiber length and weight which are not above question; moreover such measurements do not take into account that portion of the pulp whose length is inferior to some lower limit, usually of the order of 0.1 mm., which is fixed by the equipment available and by the skill and patience of the operator. Mechanical, that is screen classification, methods give data which are in the form of percentage weight distribution between screens of arbitrarily chosen mesh and which therefore do not lend themselves to ready comprehension or use. Conversion of such data into a weight average length hinges on the microscopic determination of the average length of each isolated fraction. This can be done quite accurately for the intermediate fractions and it is probable that the lengths of these intermediate fractions is reasonably constant for a given type of pulp regardless of its degree or manner of refining. The finest fraction, that which is lost in the determination and whose weight is found by difference, must be assigned an estimated value. The average length of the fraction retained on the coarsest screen is not beyond question even with wood pulp where there is an upper limit fixed by the very nature of the wood fiber; at the present writing it is not definitely known whether the average length of the fraction decreases with increasing severity of refining. In the case of rag pulp, where no maximum exists it is highly probable that the average length of the coarsest fraction does change with refining.

In their search for a method which would be as free as possible from these shortcomings, in the sense that it would provide a rapid and direct measurement without the necessity of making either assumptions or subsequent calculations, the authors have gone back to a very old qualitative practice used particularly in rag mills which consists in observing the quantity of fiber caught by a blade drawn through a suspension of fibers in water, the obvious deduction being that the more fiber withdrawn by the blade the longer the fiber must be.

The work reported below is the result of efforts to develop this princple into a standardized and reasonably accurate and rapid method. The apparatus used and the operating technique are described and data are presented to indicate how the details of the method were arrived at and to show the effects of certain variables on the results obtained.

In an appendix to the present paper, a theoretical analysis of the mechanism of the test method, made by Dr. W. B. Campbell, Director of Technical Research of the Pulp and Paper Research Institute of Canada, is presented. Data are also given that supplies strong evidence that the test results are a measure of fiber length; other data indicate that the test results are a function of the average by weight of the square root of the fiber length. The test results have therefore been termed tentatively "Fiber Length Index." However, the authors do not regard this evidence as conclusive, nor do they claim that the test results can be converted into absolute units of length.

The text which follows is therefore in the nature of a progress report and is not intended to represent

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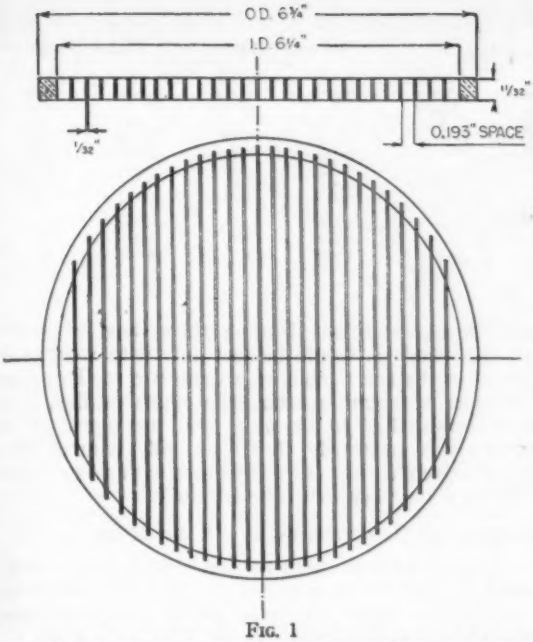


FIG. 1

Blade-Grid for Determination of Fiber Length Index. 27 Blades Equally Spaced—Total Length of Blades—3482 mm.

a completed investigation. Since the data presented in a companion paper indicate that the method can give useful information in practice, the findings are therefore reported in their present stage in the hope that other investigators may deem them of sufficient interest to warrant further study and that from such additional work the value or worthlessness of the method may be established much more rapidly than by investigation in a single laboratory.

Experimental

Apparatus

The apparatus consists of the standard British sheet machine in which the grid plate has been replaced by a bronze ring of the same diameter and depth and ¼ inch wide and in which are fixed vertically 27 equally spaced stainless steel blades ¼ inch deep and 1/32 inch thick, providing a total blade length of 3.482 meters.

Procedure

The sheet mold is clamped in place and the water turned on gently. When the water has reached above the blades and while it is rising in the mold, an appropriate volume of stock containing 10.0 grams of moisture-free pulp is poured in and the liquid in the sheet mold brought up to the mark. The liquid is stirred as when making a handsheet but with the old type stirrer without vertical vanes, care being taken not to produce a swirl. After a few seconds' pause, the dump valve is then opened to its full extent.

After drainage, the mold is opened, the blade-grid is removed and overturned in a pan containing a little less than ¼ inch of water. Practically all the fibers deposited on the blades will remain in the water when the grid is lifted out and any fibers still clinging to the blades are washed off by a fine jet of water. The operation is performed three times and the collected fibers mixed together, filtered on a weighed paper on a Buchner funnel, dried at 105°C. and weighed after cooling in a tared closed container in a desiccator. One third the weight in grams is reported as "Fiber Length Index."

For routine work the method is modified as regards the drying of the caught fibers for the sake of speed. The filtered fibers on the paper are placed on an electric hot-plate and pressed with an electric iron, the temperature of both of which is regulated so as to give as rapid drying as possible without scorching. By this abbreviated drying method, and omitting the cooling step in the desiccator, an operator can obtain a result on a stock of known consistency in 12 minutes.

Reproducibility of Results

Determinations were made using the same pulp beaten to two different degrees. Each pulp was tested first by making single determinations, that is by catching fibers on the blade-grid from a single 10-gram sample, then by making three separate determinations and combining the three portions of fibers caught from suspension. The long-fibered pulp was further tested by making five determinations.

TABLE I

Bleached Sulphate 14° S.R.						Bleached Sulphate 76° S.R.			
Single		Triple		Quintuple		Single		Triple	
Weight	% Dev.	Weight	% Dev.	Weight	% Dev.	Weight	% Dev.	Weight	% Dev.
2.536	8.9	2.311	0.1	2.267	1.6	0.294	1.0	0.293	0.3
2.355	1.1	2.299	0.4	2.277	1.1	0.299	0.7	0.291	1.0
2.368	1.7	2.266	1.8	2.291	0.5	0.299	0.7	0.297	1.0
2.277	2.2	2.301	0.3	2.335	1.4	0.299	0.7	0.295	0.3
2.309	0.9	2.354	2.0	2.331	1.2	0.292	1.7	0.285	3.1
2.362	1.4	2.236	3.1	2.336	1.4	0.297	0.0	0.293	0.3
2.237	4.0	2.346	1.6	2.305	0.1	0.292	1.7	0.296	0.7
2.197	5.7	2.319	0.5	2.300	0.1	0.300	1.0	0.300	2.0
2.344	0.6	2.370	2.7	2.306	0.1	0.302	1.7	0.299	1.7
2.302	1.2	2.281	1.2	2.284	0.8	0.300	1.0	0.296	0.3
2.329	2.77	2.308	1.37	2.303	0.83	0.297	1.02	0.294	1.07

The results show that the precision attained in single determinations with long-fibered pulp is insufficient for reliable work, that that resulting from triple determinations is adequate for all but very exact work and that only small advantage is gained by going to quintuple measurements. The method was therefore standarized on triple determinations.

The results also show that the fiber withdrawal operation is quite reproducible since the figures reported in each vertical column were determined on a single batch of diluted stock and using only one consistency figure for the series. It must however be borne in mind that to the error involved in the fiber withdrawal operation must be added the error which may arise from the determination of consistency when testing an unknown sample. This latter error may be of the order of 3% and must therefore be added to the error of the fiber length index determination.

Effect of Weight of Fiber in the Sheet Mold

Measurements were made with varying quantities of fiber in the sheet mold. Five such series are reported in Table II.

The deposits on the blades ranged from very light and uniformly distributed ones to heavy ones bridging across the blades. In spite of this the variation of the weight of deposit with variation of the total weight of fiber is surprisingly regular.

A few tests not reported here were made using weights up to 80 grams in the sheet mold. In spite of the fact that the deposits on the blades took the form of continuous mats completely bridging across the blades, the regular variation of weight of deposit versus weight in mold continued with no break in the curves.

TABLE II

Pulp No.	1		2		3		4		5	
Fiber	Bleached Sulphate		Bleached Sulphite		Rag		Bleached Sulphite		Bleached Sulphite	
° S.R.	12		14		59		48		88	
Weight in mold, g.	Deposit, g.	Propn. of #3	Deposit, g.	Propn. of #3	Deposit, g.	Propn. of #3	Deposit, g.	Propn. of #3	Deposit, g.	Propn. of #3
1	0.145	2.74	0.116	2.19	0.053	1.00	0.047	0.88	0.014	0.27
2	0.334	2.90	0.266	2.31	0.115		0.116	1.01	0.036	0.31
3	....	...	0.465	2.61	(0.178)		0.180	1.01	0.062	0.35
4	....	...	0.665	2.74	(0.243)		0.250	1.03	0.084	0.35
5	1.012	3.27	0.867	2.80	0.310		0.312	1.01	0.111	0.36
6	....	...	1.033	2.65	(0.390)		0.375	0.96	0.129	0.33
7	1.522	3.26	....	...	0.467		....	...	....	...
10	2.313	3.53	1.776	2.71	0.655		0.649	0.99	0.204	0.31
15	3.644	3.93	2.891	3.12	0.927		0.873	0.94	0.315	0.34
20	4.824	3.88	(4.00)	3.22	1.244		1.180	0.95	0.408	0.33

Note—Figures in parentheses are interpolated.

Variations from a straight line, although small, are characteristic; the early part of the curve is slightly convex upwards after which the curvature reverses and becomes slightly concave upwards. This irregularity diminishes as fiber length increases. In spite of the small deviations from a straight line, the ratio of the weights of deposits from different pulps at a given weight in the sheet mold remains substantially constant as the weight in the mold is increased. This applies for all pulps except very long-fibered ones in the case of which they appear comparatively longer, in comparison to the shorter ones, as the weight in the mold is increased. This is shown in Table II in the columns headed "Propn. of No. 3" where the deposits are expressed as a proportion of the deposit for pulp No. 3 at the same weight in the sheet mold, which deposit is arbitarily chosen as unity for purposes of comparison.

It is obvious that determinations with very large weights of fiber in the sheet mold should not be considered since the fibers lose to a considerable extent their freedom of movement and have increasing opportunity to tangle with each other and form clots; also, with increasing weights of deposit on the blades, the latter cease to function as such and there is increasing probability that fibers are caught not by the blades but by previously deposited fibers. It is obvious that ideal conditions lending themselves to a theoretical analysis would be met only with weights of fibers in the sheet mold approaching zero. However, in order to obtain reasonable weights of deposit, a compromise had to be made and the figure of 10 grams was arbitrarily chosen as still giving a manageable weight for very short pulps without excessive amounts for very long fibered stock.

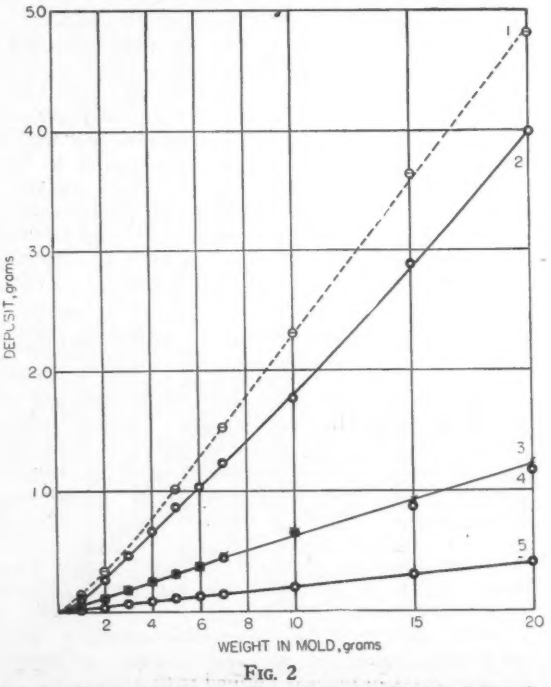


FIG. 2

Relation Between Weight in Sheet Mold and Weight of Deposit. Numbers Refer to Pulp Numbers in Table II

EFFECT OF CONSISTENCY IN SHEET MOLD

A series of measurements were made using a constant weight of 10.0 grams in the sheet mold but varying the total volume so as to change the final consistency in the mold.

TABLE III

Volume in Mold, ml.	Consistency, %	Fiber Length Index
4665	0.214	1.061
3500	0.286	1.098
2330	0.429	1.226
5830	0.171	0.947
7000	0.143	0.967

The results in Table III indicate that the effect of consistency becomes pronounced only above 0.2% and explains why the curves of deposit *vs* weight in mold (Fig. 2) becomes increasingly steep as weights beyond 15 grams are used in the mold.

EFFECT OF RATE OF OUTFLOW

The influence of the rate of outflow was briefly studied by inserting in the drainage pipe orifices of appropriate diameters and determining the fiber length index at three different rates of flow for four different pulps.

TABLE IV

	Pulp			
	4	3	2	1
Drainage Time, sec.	Rag 89° S.R.	Bleached Sulphite 52° S.R.	Alpha 37° S.R.	Alpha 22° S.R.
4	0.068	0.479	0.824	1.397
30	0.065	0.719	1.177	2.102
66	0.082	0.850	1.459	2.632

It will be noted that the results produce a family of curves ranging from very slightly concave for the very highly refined and very short rag stock to markedly convex for the slightly beaten long-fibered alpha pulp.

The long drainage time gave the obvious advantage of heavier deposits on the blades. However, this was abandoned for two reasons. The first was the fact that theoretical considerations required conditions of turbulent flow between the blades and that an examination of the flow conditions revealed that even at the highest drainage rate obtainable, flow was only just at the borderline between stream-line and turbulent. The second reason was that if a low rate of flow was adopted, the necessity arose of either working at constant temperature, an impractical stipula-

tion, or devising correction tables which threatened to be an extremely tedious procedure.

Effect of Temperature

A few measurements were made to investigate very briefly the effect of temperature with the full opening of the dump valve and consequently the highest possible rate of drainage.

TABLE V

Temperature, °C.	Fiber Length Index
9	0.991
17	0.990
23	1.010
33	1.105
40	1.147

The results in Table V show that up to 25°C. the effect of temperature is negligible. Since mill water supplies seldom exceed this figure, there appears to be no need for temperature control or corrections.

Effect of Blade Cross Section

Before the final blade-grid was constructed, trial grids were constructed containing only five blades. Three grids were made, one with the upper edge of the blades bevelled and sharpened, one with the upper edge rounded off and one with the blades cut square; all blades were of the same thicknesses, 1/32 inch.

Measurements were made with a bleached sulphite beaten to three different degrees.

TABLE VI —

Slowness,	Weight of Deposit		
° S.R.	Sharp	Round	Rectangular
16	0.216	0.200	0.223
20	0.107	0.111	0.115
80	0.054	0.057	0.057

Although there was a tendency for the rectangular blade to collect slightly higher deposits, the differences between the three types of blades appear neither systematic nor significant. The rectangular blades were therefore chosen for ease in construction.

Appendix

Theoretical

The very nature of the test method made it appear plausible that, even though numerical results might be affected by such factors as fiber flexibility and condition of fiber surface, the test must be primarily related to fiber length. Unfortunately, because of the shortcomings of the two available methods, microscopic measurement and screen classification, discussed in the introduction, there appeared to be no infallible means for directly verifying this assumption or for converting the results obtained into conventional units of length.

Dr. W. B. Campbell, who took a keen interest in the investigation, made an analysis of the mechanism of the test method which is presented below with his kind permission.

"It is assumed that a suspension of stock contains c g./ml. of fibers of length L cm. and that these fibers weigh m g./cm. length. Fibers of other lengths and weights per unit length are also presumed present in other concentrations. The whole concentration is assumed to be so low that all fibers are free to move independently of each other.

Suppose the flow is downward past a horizontal wire. Any fiber can lie with its axis at any angle, there being no preference in this regard. If one end of the fiber is considered fixed, the other end can occupy any point on the surface of a sphere of radius L cm. The area of this surface is $4 \pi L^2$ sq. cm.

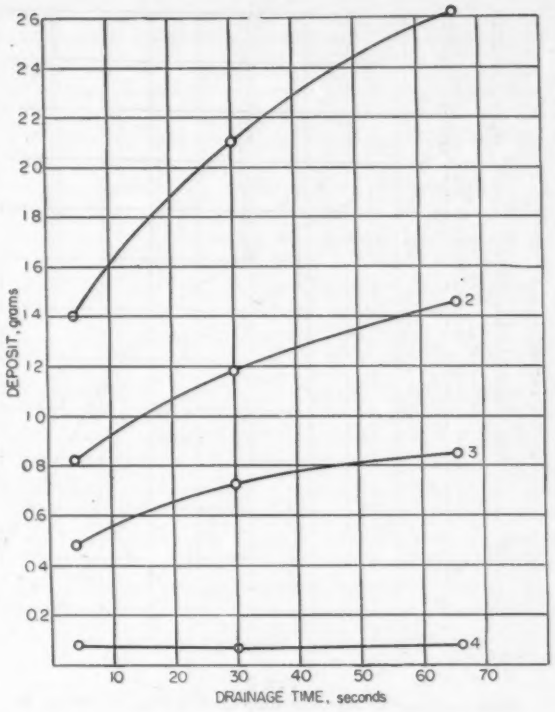


Fig. 3

Effect of Rate of Outflow on Weight of Deposit. Numbers Refer to Pulp Numbers in Table IV

If the fixed end of the fiber passes the wire at a horizontal distance x cm. from it, then the number of positions of the fiber which will lead to contact with the wire will be represented by points on the surface of a spherical segment of radius L cm. and height $(L - x)$ cm. The area of such segment surface is $2 \pi L (L - x)$ sq. cm.

Consequently, if a fiber of length L is passing the wire with one end at a distance x from it, then the probability of the fiber hitting the wire is the ratio of the two surafces or $(L - x)/2L$. This takes into account only stock on one side of the wire.

The volume of stock passing the wire at distances between x and $(x + dx)$ cm. is dx ml. per cm. stock travel and per cm. wire length. The number of fibers of length L is c/mL per ml. of stock. Consequently, for such travel there will be cdx/mL fiber ends pass at a distance between x and $(x + dx)$ cm.

The probability of any one of these hitting the wire is $(L - x)/2L$. Hence the frequency of hits from fibers passing with one end at this distance is

$$(L - x) \cdot c \cdot dx/2L^2 \cdot m.$$

This takes into account only the stock passing on one side of the wire. For both sides the frequency is, of course, double this value.

The maximum distance at which hits can be registered is L cm. The total number of hits of fibers passing (both sides of wire) within this distance is

$$\int_0^L \frac{c \cdot (L - x)dx}{L^2 m} = \frac{c}{2m}$$

Each fiber has a weight of Lm grams. Consequently the weight of the fibers which hit is $cL/2$ grams.

It is probable that not all fibers which hit the wire

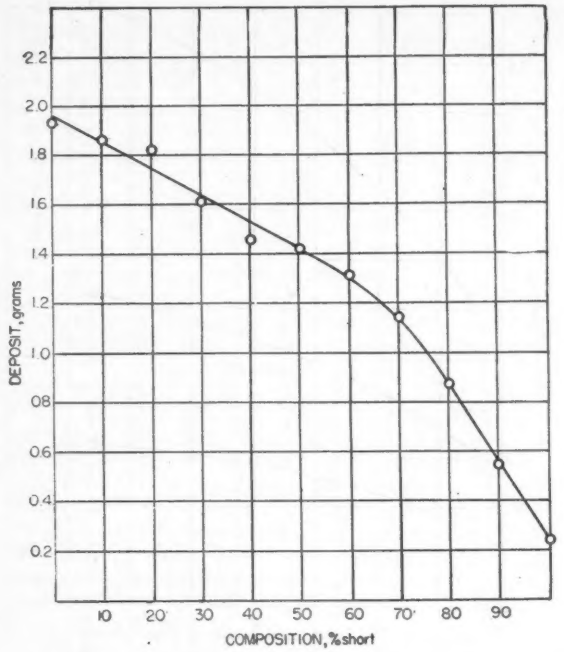


FIG. 4
Relation of Composition of Mixture of Two Pulps to Weight of Deposit

cling to it. It is quite likely that a hit must be registered within a certain fraction of the fiber length lying in the center portion of the fiber. If this fractional length is f then the number of effective hits will be reduced by the factor f and the weight fibers which cling will be $f.c.L/2$ g.

The total stock concentration is made up of

c_1 gram of fibers of length L_1 cm.
c_2 gram of fibers of length L_2 cm.
c_3 gram of fibers of length L_3 cm., etc.

which add up to

C gram of fiber of weighted average length $\frac{\Sigma\, cL}{C}$ cm.

The total weight of fiber on the wire will be the sum of such terms as $f.cL$ where c and L refer to the concentrations of the different fiber lengths of the stock mixture. Hence this weight, divided by the total stock concentration, will be proportional to the weighted average fiber length of the stock mix.

These calculations can not be expected to hold if the stock concentration is so great that fibers do not float freely. Also the determination would fail if stock accumulation on the wire became so great as to prevent it acting as a narrow edge. Another possible source of failure would be if the factor, f, is not constant for all fiber lengths."

The authors have the following comments to make on Dr. Campbell's analysis:

Attention should be drawn to the reservations made in the last paragraph. In the first place, it is recognized that the experimental technique adopted for practical considerations fail to meet the conditions stipulated in the sense that the weight of fiber used in the sheet mold does not allow the fibers perfect freedom of motion and that, in practically all determinations, the quantity of fibers accumulated on the blades is such that the blades cease to function strictly as such. However the data presented in Tables II and III indicate that these deviations from ideal conditions do not have a serious effect.

More serious may be the question of the factor "f" which may well vary from pulp to pulp with such fiber characteristics as flexibility and surface condition and may not inconceivably be itself a function of fiber length. Therefore, although Dr. Campbell's analysis shows clearly that the weight of fiber caught by a blade should bear a close relationship to fiber length, it should not be surprising if the relationship between these two quantities were something more complex than direct proportionality.

EXPERIMENTAL

With a view to gaining indirectly further insight into the mechanism of the test procedure, the following experiments were performed.

Two pulps of obviously widely differing fiber length were mixed in varying proportions and the fiber length index of each mixture determined. The results obtained are shown in Table VII and in Fig. 4.

TABLE VII

Pulp No. 1, %	100	90	80	70	60	50	40	30	20	10	0
Pulp No. 2, %	0	10	20	30	40	50	60	70	80	90	100
F.L.I.	1.93	1.86	1.82	1.61	1.46	1.42	1.31	1.14	0.87	0.54	0.23

The curve through the points is of the form.

$$F = \sqrt{x\,F_1^2 + (1-x)\,F_2^2}$$

where F = Fiber length index for mixture
F_1 = Fiber length index of pulp No. 1 alone
F_2 = Fiber length index of pulp No. 2 alone
x = Fraction of pulp No. 1 in mixture.

To confirm this finding, three different pulps were again taken and the fiber length indices determined and calculated for different mixtures.

TABLE VIII

Fraction of			Fiber Length Index		Difference % of
No. 1	No. 2	No. 3	Determined	Calculated	Determined
1	..	..	1.48	...	..
..	1	..	0.90	...	..
..	..	1	0.61	...	..
..	½	½	0.81	0.77	—4.9
½	..	½	1.10	1.13	—2.7
½	½	..	1.19	1.22	—2.5
⅓	⅓	⅓	1.24	1.18	—4.8
⅓	⅓	⅓	1.06	1.06	0.0

Calculated and determined values agree within experimental error, therefore confirming the form of the equation derived. It follows from this that if the weight of fibers caught by the blades is a measure of average fiber length then this weight is a function not of fiber length but of its square root.

In the hope of obtaining direct, even though only approximate, evidence that the test method gave results which were related to fiber length, a number of pulps were prepared, their fiber length index measured, and the pulps classified with the Johnston classifier. From the classification figures and the values supplied by the Pulp and Paper Research Institute for the average lengths of the fractions, average lengths by weight were calculated using the lengths of the fractions, their squares, and their square roots. A sample calculation is given below and is followed by a summary of all data in Table IX.

Sample calculation of average length for a bleached sulphate:—

Fraction	% by Weight	Average Length of Fraction, mm.	Product of % by Weight and Av. Length
Retained 28 mesh.....	25.7	2.27	58.4
— 28+ 48 mesh.....	28.4	1.28	36.3
— 48+100 mesh.....	17.8	0.85	15.1
— 100+200 mesh.....	11.7	0.45	5.3
Pass 200 mesh.....	16.4	0.20	3.3
		Total	118.4
		Average	1.18

The average lengths calculated as above are designated in Table IX by L; those calculated using the square root of the fraction lengths by $\sqrt{L}$ and those using the squares of the lengths by L^2. The values used for the bleached sulphites were the following:

Retained 28	mesh	2.14 mm.
– 28+ 48	mesh	1.14 mm.
– 48+100	mesh	0.67 mm.
– 100+200	mesh	0.39 mm.
Pass 200	mesh	0.15 mm.

TABLE IX

Sample No.	Fiber Length Index	°S.R.	Screen Classification +28	28/48	48/100	100/200	–200	Calculated Average Length L	$\sqrt{L}$	L^2
			Bleached Sulphates							
1	2.28	12	83.1	9.2	3.3	1.5	2.9	2.04	1.41	4.47
2	1.76	12.5	76.4	10.3	4.7	2.2	6.4	1.93	1.36	4.05
3	1.79	13.5	81.1	8.2	3.2	1.4	6.1	1.99	1.38	4.35
4	1.22	15.5	61.0	16.3	8.3	3.5	10.9	1.70	1.25	3.49
5	1.15	35	67.0	13.6	6.3	4.4	8.7	1.78	1.29	3.74
6	0.89	21	51.7	23.8	11.5	5.7	7.3	1.62	1.23	3.16
7	0.87	68	59.4	15.9	7.4	5.5	11.8	1.66	1.24	3.29
8	0.51	71	25.7	28.4	17.8	11.7	16.4	1.18	1.02	1.95
9	0.31	...	7.2	18.5	17.1	12.7	44.5	0.69	0.76	0.84
			Bleached Sulphites							
10	1.76	13.5	64.6	12.5	5.8	5.8	11.3	1.60	1.20	3.16
11	1.52	13	61.6	12.3	5.3	2.9	17.9	1.53	1.16	3.02
12	1.02	18.5	46.0	19.5	10.2	10.2	13.1	1.33	1.08	2.43
13	0.66	31	31.8	20.2	13.9	8.1	26.0	1.07	0.95	1.80
14	0.46	80	25.0	17.2	23.9	12.5	21.4	0.97	0.91	1.50

From the data in Table IX a number of observations and comments may be made:

(a) A relationship definitely appears to exist between fiber length index and average fiber length as calculated from screen classification data. However, in spite of the fact that, because of the method of calculation, L, $\sqrt{L}$ and L^2 should bear no constant relationship one to the other, the data does not allow to distinguish of which of these fiber length index is a function.

(b) The relationship between fiber length index and average fiber length is different for the two types of pulp tested.

(c) Fiber length index is much more sensitive to changes in fiber length than any of the three calculated average lengths.

(d) Attention is drawn to samples 2 and 3, 4 and 5, and 6 and 7, which form three sets of pairs. Each pair was beaten to very nearly the same fiber length index but the even-numbered samples were beaten as rapidly as possible at low consistency and under high roll pressure in order to obtain minimum fibrillation with as rapid cutting as possible whereas the odd-numbered samples were beaten very slowly at high consistency and low roll pressure with a view to achieving a high degree of fibrillation. The screen classification of the two members of each pair show small but significantly systematic differences (with the exception of the 200-mesh fraction of sample No. 4 which is obviously high) and the Schopper-Riegler slowness values show an increasingly wide spread as the pulp is further shortened; in spite of this, the pairs of calculated average length values are in remarkably close agreement. It is therefore justifiable to conclude that fiber length index is independent of the type of refining which the pulp has undergone or of its slowness (or freeness).

(e) The data reported above might be viewed as constituting the beginning of a sort of calibration table for converting fiber length index values into average lengths expressed in conventional length units. This the authors do not feel to be justified in view of the admitted uncertainty in the average length values assigned to the various screen classification fractions which may vary slightly with the weight of the next coarser fraction. There is still doubt concerning the constancy of the average length value of the coarsest fraction which may quite possibly decrease with increasing refining of the pulp; this point is at present under study at the Pulp and Paper Research Institute. Moreover, no average length value

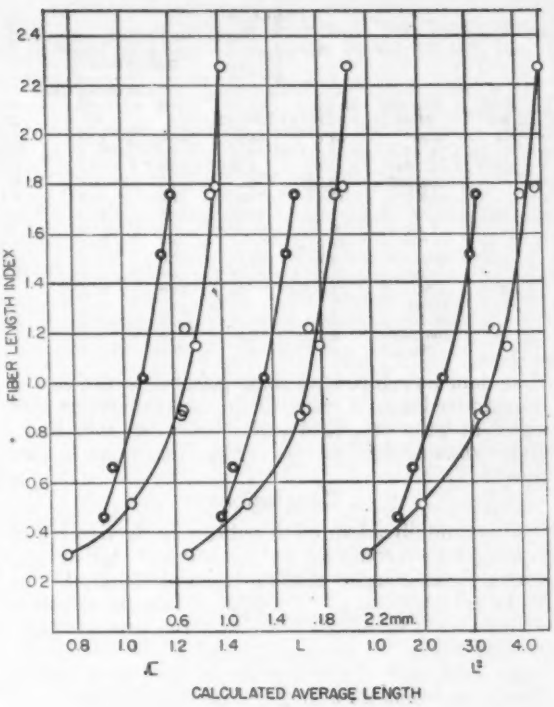


FIG. 5

Relation Between Fiber Length Index and Average Lengths Calculated from Johnston Classifier Data
○ Bleached Sulphate. ◎ Bleached Sulphite

may be assigned in the case of rag pulps where no maximum fiber length exists as in the case of wood pulp.

Another effort was made to determine the nature of the relationship between fiber length index and fiber length. A bleached sulphite pulp was beaten to three different degrees. Each sample was then treated exactly as in the fiber length index determination except that the fibers caught on the blades were not filtered and dried but accumulated until sufficient was available to run a screen classification test. These selected fibers and the original pulp were then classified. The classification of the selected fibers was then calculated as shown in the sample calculation below:

Fraction Mesh	Average Length, mm.	Classification Original Pulp, %	Weight Caught Should Be Proportioned To		Classification of Caught Fibers Should Be
+28	2.14	61.6	61.6×2.14=	131.7	131.7÷1.531=86.0%
–28+48	1.14	12.3	12.3×1.14=	14.0	14.0÷1.531= 9.2
–48+100	0.67	5.3	5.3×0.67=	3.6	3.6÷1.531= 2.3
–100+200	0.39	2.9	2.9×0.39=	1.1	1.1÷1.531= 0.7
–200	0.15	17.9	17.9×0.15=	2.7	0.3÷1.531= 1.8
			Total	153.1	100.0

Classification of the caught fibers was calculated using the average lengths of the fractions, their square roots, and their squares. The results are given in Table X.

If one bears in mind that the figures reported are from single determinations, there being insufficient material to run checks, and also the possible errors in the values assigned for the average lengths of the coarsest and finest fractions, agreement between the observed classification of the caught fibers and that calculated on the basis of the square root of the fraction lengths is within reason and certainly much better than if a higher power of these lengths is used.

TABLE X

Pulp No.	Fraction Mesh	Original Pulp	Screen Classification: Caught Fibers: Observed	Calculated Using: L	Calculated Using: $\sqrt{L}$	Calculated Using: L^2
1	+28	61.6	66.9	86.0	77.4	93.7
	28/48	12.3	13.1	9.2	11.4	5.3
	48/100	5.3	4.6	2.3	3.7	0.8
	100/200	2.9	2.6	0.7	1.5	0.1
	—200	17.9	12.8	1.8	6.0	0.1
2	+28	31.8	48.8	63.3	49.2	81.0
	28/48	20.2	18.9	21.4	22.8	14.5
	48/100	13.9	10.1	8.7	12.0	3.5
	100/200	8.1	4.9	3.0	5.3	0.7
	—200	26.0	17.3	3.6	10.7	0.3
3	+28	25.0	39.5	55.0	40.3	76.4
	28/48	17.2	18.6	20.2	20.3	14.9
	48/100	23.9	11.7	16.5	21.5	7.1
	100/200	12.5	9.5	5.0	8.6	1.3
	—200	21.4	20.7	3.3	9.3	0.3

The data therefore lend some support to the conclusion arrived at as a result of the experiments on mixtures of pulp described earlier that the fiber length index should be a function of the square root of fiber length.

Conclusions

It is candidly admitted that this investigation is presented at an incomplete and somewhat unsatisfactory stage. It is equally candidly admitted that the authors' primary aim was not to devise an exact method of measuring with high accuracy a fundamental property of fibers but to secure a tool which would give some reasonable estimate of that property, namely length, and thus fill a long-felt need in the control of stock preparation. A companion paper reports the use which has been made of the fiber length index test method in establishing relationship between it and the papermaking qualities of pulp and indicates that the method shows promise of being useful in everyday paper mill practice. This is therefore deemed to justify the publication of the method in the hope that it may be judged of sufficient interest to receive further study elsewhere and that in this way answers may be forthcoming more rapidly to the questions which the authors have left unanswered.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Donald E. Baker, Technical Director, Container Corporation of America, Wabash, Indiana, a 1941 graduate of the Michigan College of Training and Technology. He was formerly employed by Allied Paper Mills, Kalamazoo, Michigan.

Charles H. Billington, Production Planner, American Coating Mills, Elkhart, Indiana. Attended Butler College. Formerly employed by the United Paperboard Company and Container Corporation of America, both of Wabash, Indiana.

Robert Case Dennison, Vice-President, Case Brothers, Inc., Manchester, Connecticut. He attended the University of Maine and the Babson Institute.

Gregg J. Frelinger, Vice-President and General Manager, J. W. Butler Paper Co., Chicago, Illinois, a 1928 graduate of the University of Wisconsin.

Edward S. Gantt, Service Man, Corn Products Sales Co., Chicago, Illinois, a 1921 graduate of Northwestern University. He was formerly employed by the First National Bank of Chicago, Illinois.

Raymond E. Green, Electrical Engineer, Rao Electrical Equipment Co., Inc., New York, N. Y., a 1925 graduate of Georgia School of Technology. He was formerly employed by the Georgia Power Co., Atlanta, Georgia; Union Bag & Paper Corp., Savannah, Georgia; and the Tennessee Eastman Co., Oak Ridge, Tennessee.

James H. Groves, Training Director, Union Bag & Paper Corp., Savannah, Georgia, a 1927 graduate of the Georgia School of Technology. He was formerly employed by the Bibb Manufacturing Co., Columbus and Macon, Georgia; Georgia School of Technology, Atlanta, Georgia; War Manpower Commission, Atlanta, Georgia; and the Thomaston Public Schools, Thomaston, Georgia.

Lewis J. Hayhurst, Owner and Director, Hayhurst Research Laboratory, Chicago, Illinois, a 1940 graduate of the University of Notre Dame. Formerly employed by Union Asbestos & Rubber Co., Cicero, Illinois; and Williamson Adhesives, Chicago, Illinois.

Alfred M. Heald, Research Chemist, Marathon Corporation, Menasha, Wisconsin, a 1939 graduate of the Institute of Paper Chemistry.

Joe B. Homan, Technical Service Engineer, A. E. Staley Manufacturing Co., Decatur, Illinois. Attended the University of Mississippi. He was formerly employed by Union Bag & Paper Corp., Tacoma, Washington; St. Regis Kraft Co., Tacoma, Washington; Champion Paper & Fibre Co., Pasadena, Texas; and the Hollingsworth & Whitney Co., Mobile, Alabama.

Aladar Kelen, Factory Manager, China Fibre Container Co., Shanghai, China, a graduate of the Technical University, Vienna.

Franklin W. Kohler, Vice-President, The Kohler System Co., Chicago, Illinois, a 1922 graduate of the University of Pennsylvania.

Oscar A. Mockridge, Jr., Chemical Engineer, Eagle Picher Co., Insulation Div., Joplin, Missouri, a 1931 graduate of Princeton University. He was formerly employed by United Color & Pigment Co., Newark, New Jersey; Johns-Manville Sales Corp., New York, N. Y.; WPB Chemicals Bureau, Protective Coatings Branch, Washington, D. C.

Harry S. Pedley, Control Chemist, Chase Bag Co., Chagrin Falls, Ohio, a 1946 graduate of the New York State College of Forestry.

William E. Reynolds, Junior Chemist, Johns-Manville Products Corp. of Virginia, Jarratt, Virginia, a 1938 graduate of Virginia Polytechnic Institute. He spent four years in the United States Army.

John H. Symes, Superintendent of Laminating Dept., American Coating Mills, Inc., Elkhart, Indiana, a 1936 graduate of Miami University. He was formerly employed by the Philip Carey Manufacturing Co., Lockland, Ohio; and the Gummed Products Co., Troy, Ohio.

Alexander Szwarc, Consulting Chemist, Canada Paper Co., Montreal, P. Q., Canada, a 1925 graduate of the University of Poznan, Poland. He was formerly employed by the St. Denis Co., Paris, France; Allied War Supplies Corp., the Howard Smith Paper Co., and the Canadian National Railways, all of Montreal, P. Q. He also spent two years in the Polish Army.

Alfred L. Trumpler, Sales Engineer, The Dicalite Co., Buffalo, New York, a 1940 graduate of Lehigh University. He was formerly employed by the Timken Roller Bearing Co., Canton, Ohio, and served for three years in the United States Navy.

Vernon E. Varhus, Development Engineer, General Mills, Inc., Minneapolis, Minnesota, a 1940 graduate of the University of Minnesota. He has been with General Mills, Inc. since graduation.

Charles Webber, Managing Director, The Bristol Co. of Canada Ltd., Toronto, Ont., Canada. He has been with the company for twenty-nine years.

Paper and Paper Stock Imports At New York and Other Ports

NEW YORK IMPORTS

WEEK ENDING NOVEMBER 2, 1946

SUMMARY

Newsprint	11,331 rolls
Coated Paper	74 cs.
Paperhangings	66 bls., 1 cs.
Printing Paper	58 cs.
Photo Paper	163 cs.
Filter Paper	30 cs.
Drawing Paper	9 cs.
Carbon Paper	1 cs.
Writing Paper and Envelopes	3 cs.
Tracing Cloth	57 cs.
Tissue Paper	2 cs.
Miscellaneous Paper	1 cs.

NEWSPRINT

New York Journal American, Markland, Liverpool, N. S., 914 rolls.

N. Y. Tribune, Inc., Markland, Liverpool, N. S., 1679 rolls.

N. Y. World-Telegram, Markland, Liverpool, N. S., 601 rolls.

Brooklyn Eagle, Inc., Markland, Liverpool, N. S., 730 rolls.

Herald Statesman, Inc., Markland, Liverpool, N. S., 42 rolls.

H. G. Craig Co., Newscarrier, Donpaco, 371 rolls.

H. G. Craig Co., Inc., A.C.D., Donnaconna, 353 rolls.

H. G. Craig Co., G.D.D., Donnacona, 368 rolls.

H. G. Craig Co., Donpaco, Donnacona, 377 rolls.

News Syndicate Co., Edward W. Cripps, Baie Comeau, 5896 rolls.

COATED PAPER

F. P. Gaskell Co., Inc., Elysia, Glasgow, 74 cs. (for cigarette tips).

PAPERHANGINGS

W. H. S. Lloyd & Co., American Banker, London, 66 bls., 1 cs.

PRINTING PAPER

Oxford University Press, Innishowen Head, Liverpool, 58 cs.

PHOTO PAPER

J. J. Gavin Co., Fort Miami, London, 3 cs. (unsensitized).

Lee Transport, Inc., Fort Miami, London, 20 cs. (base).

Lee Transport, Inc., American Banker, London, 140 cs. (base).

FILTER PAPER

H. Reeve Angel & Co., Inc., American Banker, London, 30 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., American Banker, London, 3 cs.

J. E. Bernard & Co., American Banker, London, 1 cs.

Bankers Trust Co., American Banker, London, 5 cs.

CARBON PAPER

Mynol Chemical Co., Stanley R. Fisher, Liverpool, 1 cs.

WRITING PAPER AND ENVELOPES

Bankers Trust Co., American Banker, London, 3 cs.

TRACING CLOTH

E. Dietzgen & Co., Innishowen Head, Liverpool, 14 cs. (bleached cotton).

Keuffel & Esser Co., Innishowen Head, Liverpool, 11 cs. (bleached cotton).

Keuffel & Esser Co., Stanley R. Fisher, Liverpool, 32 cs. (bleached cotton).

TISSUE PAPER

Meadows Wye & Co., Stanley R. Fisher, Liverpool, 2 cs.

MISCELLANEOUS PAPER

Stevens Nelson Paper Corp., Kanangoora, Gothenburg, 1 cs.

RAGS, BAGGINGS, ETC.

Textile & Paper Supply Corp., Fernbrook, Alexandria, 112 bls. cotton waste.

Castle & Overton, Inc., Fernbrook, Alexandria, 161 bls. old white cotton rags.

(———), Fernbrook, Alexandria, 31 bls. old colored cotton rags.

McKay & Co., Nairnbank, Cochin, 200 bls. cotton waste.

New England Waste Co., Nairnbank, Cochin, 200 bls. cotton waste.

Camden Fibre Mills, Nairnbank, Bombay, 265 bls. cotton waste.

Schimmel Trading Corp., Nairnbank, Bombay, 100 bls. cotton waste.

Riverside Mills, Nairnbank, Bombay, 50 bls. cotton waste.

J. M. Hagy, Rio Neuqueen, Recife, 108 bls. cotton waste.

A. W. Fenton Co., Elysia, Glasgow, 29 bls. rags.

J. A. Manning Paper Co., Inc., American Banker, London, 84 bls. paperstock.

Harmon Lichtenstein & Co., Elysia, Glasgow, 49 bls. rags.

American Express Co., American Banker, London, 5 bls. paperstock.

(———), Innishowen Head, Liverpool, 28 bls. new wool rags; 3 bls. wool thread waste.

Padawer Co., Delane, Pernambuco, 216 bls. cotton waste pickers.

New England Waste Co., Delane, Pernambuco, 106 bls. cotton waste-pickers.

Padawer Trading Co., Delane, Pernambuco, 70 bls. cotton waste.

Cowa & Co., Delane, Pernambuco, 115 bls. cotton waste.

Royal Manufacturing Co., Delane, Santos, 35 bls. cotton picker waste; 17 bls. cotton thread waste.

American Cotton Products Co., Delane, Santos, 33 bls. cotton waste.

Textile & Paper Supply Corp., Minot Victory, Alexandria, 106 bls. cotton waste.

E. Butterworth & Co., Inc., Stanley R. Fisher, Liverpool, 74 bls. old bagging.

American Cotton Products Co., Highland, Santos, 43 bls. cotton waste.

New England Waste Co., Highland Prince, Santos, 91 bls. cotton waste-pickers.

GLUESTOCK, ETC.

J. Gorvers, Linda Dan, Buenaventura, 111bdls. hidecuttings.

J. Gorvers, Santa Ines, Barranquilla, 80 bdls. hidecuttings.

(———), Delane, Santos, 110 bags bone glue.

Transatlantic Animal By-Products, Inc., Highland Prince, Montevideo, 120 bags hideglue.

CASEIN

Casein Co. of America, Division of The Borden Co., Biddeford Victory, Buenos Aires, 1111 bags casein.

(———), Delane, Buenos Aires, 600 bags lactic casein, 30,000 kilos.

Guaranty Trust Co., Delane, Buenos Aires, 4064 bags lactic casein, 203,211 kilos.

Aralac, Inc., Highland Prince, Buenos Aires, 833 bags casein.

WOODPULP

National City Bank, Kanangoora, Rauma, 108 bls. dry white mechanically ground woodpulp.

Pulp Sales Co., Inc., Kanangoora, Rauma, 412 bls. bleached strong sulphite pulp; 6334 bls. soft sulphite pulp.

NEW YORK

In transit to Alexandria, Va.

WEEK ENDING NOVEMBER 2, 1946

Washington Post, Markland, Liverpool, N. S., 2485 rolls newsprint.

Alexandria Gazette, Markland, Liverpool, N. S., 24 rolls newsprint.

Sun Arlington, Markland, Liverpool, N. S., 6 rolls newsprint.

BOSTON IMPORTS

WEEK ENDING NOVEMBER 2, 1946

K. J. Quinn, Delane, Buenos Aires, 200 bags casein, 10,000 kilos.

Empire Fibre Co., Hannibal Victory, Shanghai, 100 bls. cotton waste.

Leigh Textile Co., Hannibal Victory, Shanghai, 100 bls. cotton waste.

1st National Bank of Boston, Highland, Buenos Aires, 8 bls. wool thread waste; 18 bls. thread waste.

PHILADELPHIA IMPORTS

WEEK ENDING NOVEMBER 2, 1946

Perkins Goodwin & Co., Coffeyville Victory, Hernosand, 1219 bls. half prime strong sulphite pulp; 610 bls. 1st quality kraft pulp.

Gottesman & Co., Inc., Coffeyville, Victory, Hernosand, 7924 bls. half prime strong sulphite pulp; 1219 bls. 1st quality strong sulphite pulp.

Elof Hansson, Inc., Coffeyville Victory, Hernosand, 11,280 bls. dry sulphite pulp.

Pagel Horton & Co., Inc., Coffeyville Victory, Gefle, 508 bls. woodpulp.

BALTIMORE IMPORTS

WEEK ENDING NOVEMBER 2, 1946

Pagel Horton & Co., Inc., Coffeyville Victory, Hernosand, 3048 bls. half prime strong sulphite pulp.

Pagel Horton & Co., Inc., Coffeyville Victory, Gefle, 3556 bls. woodpulp.

Week's Record of Trends in The Pulp and Paper Market

Office of the PAPER TRADE JOURNAL,
Wednesday, November 6, 1946.

Hardwood trees will be the solution of the problem of the paper industry in obtaining an adequate supply of raw material in New York State in the opinion of Professor Clarence E. Libby, head of the Department of Pulp and Paper Manufacture, New York State College of Forestry at Syracuse University. Professor Libby, who has been directing extensive research in the College laboratories on this problem, further states that some of the hardwood pulps which his research staff have developed are not only satisfactory substitutes for spruce pulp, but possess properties which actually improve the quality of certain specialty papers. These new developments in hardwood pulping and the improved pulp thus secured is the result of months of intensive research at the College. The new developments reportedly guarantee that hardwood pulps with a widely increasing range of usefulness, will soon become available to the paper industry in the northeastern states. The problem of pulp supply from hardwoods in the Northeast, and particularly in New York State, is of prime importance to the paper industry because hardwoods grow in great profusion in this section of the United States, while spruce, from which many kinds of paper is produced, has become very scarce. The scarcity has made the Northeast a large importer of pulpwood and paper pulps.

Perhaps the above paragraph on the future use of Northeastern hardwoods takes on added significance by OPA's action on October 31 suspending ceiling prices for pulpwood imported from the three Canadian Provinces of Quebec, New Brunswick and Nova Scotia. Approximately 1,000,000 cords of pulpwood are imported annually from these three Canadian Provinces, an amount representing about 30 per cent of the total pulpwood consumption in the Northeastern United States, the area where these particular imports go. Present prices range from $8.50 to $18.25 a cord, f.o.b. car at shipping point in Canada, a level now equal to levels recently established for sales of this pulpwood in Canada.

Before the lifting of price restrictions, increases had been authorized ranging from 50 cents to $3.50 a cord on all imports from August 19, when adjustable pricing was authorized pending completion of a study to determine the extent of increase required. No change was made in the ceiling prices of pulp and paper products made from the imported pulpwood.

Market conditions for groundwood printing, book and fine papers show little change. Production continues at high levels, but is insufficient to keep pace with demand. Mills report a backlog of orders representing about three months' production, and are allocating output among their customers. Coarse paper manufacturers are increasing their production but are still unable to fill demands. Savannah kraft mills operating 24 hours a day have a backlog of unfilled orders reaching an all-time high. Minnesota kraft mills on a 24 hour, 7 day week basis plan to discontinue some grades of kraft as they show a definite loss. Reports indicate kraft papers are in the shortest countrywide supply of all paper items. Sanitary, tissue and absorbent papers are all showing gradual improvement. Supplies of paper towels appears to be less short than in recent months.

The index of general business activity for the week ended October 26 rose to 138.5 from 134.1 in the previous week, compared with 118.9 for the corresponding week in 1945. The index of paperboard production rose to 163.5 from 148.1 in the previous week, compared with 145.9 for the corresponding week in 1945.

Paper production for the week ended October 26 was estimated at 106.8 per cent, compared with 105.1 for the preceding week, with 95.8 for the corresponding week in 1945, with 91.3 for 1944, with 88.5 for 1943, and with 92.2 per cent for the corresponding week in 1942.

Paperboard production for the week ended October 26 was 101.0 per cent of capacity, compared with 98.0 per cent for the preceding week, with 98.0 for the corresponding week in 1945, with 95.0 for 1944, with 94.0 for 1943, and with 84.0 per cent for the corresponding week in 1942.

Wood Pulp

The Swedish pulp industry operated at around 70 per cent of capacity during the first half of 1946. The rate of operation dropped about 15 per cent during June and July due to mill shutdowns for vacations. The yearly average of operation is expected to be around 65 per cent. Production during the first half of the year has been nearly 800,000 metric tons of market chemical pulp. During this same period and up to August 1, 1946, shipments have exceeded production. This means that stocks have been appreciably reduced from their highest figure for the year, which was about 475,000 metric tons in May. The stocks on July 31 were about half this amount. There is a possibility that the mills will operate for storage rather than sell at present American prices, present low stocks allowing such a procedure.

Rags

Reports seem to indicate the possibility that new cotton cuttings may be decontrolled soon now that the election day excuse has come and gone. To date, it has been practically impossible to obtain new cuttings at legal prices.

Foreign dark cottons are reported at $52 per ton ex-dock Atlantic port. Domestic rags remain at top levels, with mills still paying $55 shipping point for heavy wipers.

Old Rope and Bagging

Foreign offerings of Manila, which most always turn up as sisal, receive little attention in this steady market. All quotations from Manila to paper strings remain unchanged.

Market for bagging remains firm with some consumers reported paying $4.50 f.o.b. northern shipping point for gunny. No. 1 scrap burlap remains $4.50 to $4.75 delivered for the best packs. Other quotations remain unchanged.

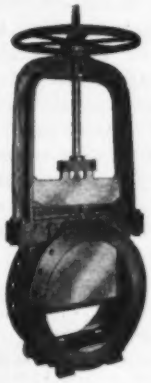
Cowles Sues to Uphold Hydrapulper Patent

CAYUGA, N. Y.—The Cowles Company, owner of patents covering the Cowles Hydrapulper, has filed suits for patent infringement against San-Nap-Pak Manufacturing Company, Inc. and Frost White Paper Mills, Inc., charging that these mills are infringing the Cowles patents by using Apmew pulpers sold by American Paper Machinery and Engineering Works, Inc. of Glens Falls. The suits were filed in the United Sttaes District Court for the Southern District of New York, and demand an accounting for profits and damages as well as an injunction against further use of the machines.

The Black-Clawson Company which acquired license rights under the Cowles patents, at the time it took over the Dilts Machine Works of Fulton, N. Y., appears as co-plaintiff in the infringement suits. Since the merger of Dilts with the Black-Clawson Company, Hydrapulpers have been sold through both the Dilts and Shartle divisions of the Black-Clawson Company.

Fogelstrom Now With Brown-Bridge

TROY, Ohio — T. W. Fogelstrom, widely known in the paper industry, has recently joined the Brown-Bridge Mills, Inc. For more than twenty years Mr. Fogelstrom has been identified with the Mid-States Gummed Paper Company of Chicago and has developed a wide circle of friends in his successful efforts to popularize various Mid-States lines. He will headquarter in the Chicago offices at 608 S. Dearborn Street, where the gummed paper manufacturers have made their headquarters for some years.



RECORD PAPER & PULP STOCK VALVES "BONNETLESS SELF CLEARING" – – – "RESIDUE POCKETLESS TYPE"

METALS — I.B.B.M. all iron, bronze or stainless steels, body parts plain or rubber lined.

The photo of 24" Fig. 241 I. B. B. M. valve while illustrating the gate bottom wedge system for forced gate seating and "GUILLOTINE" edge for shearing fibre at seat also shows the packing box and yoke as separate units. Both adjustable.

- The "FAST THREADED" screw stem and ball bearing speeds valve operation.
- The packing box is extra deep, is adjustable and provided with specialized lubricated packings and special type gland and compression bolts.
- The yoke mountings are such that yokes for various methods of gate operation are interchangeable.
- Replaceable gate edge shoes are used in valves 10" and larger. These shoes are of special value when valves are installed stem and pipe horizontal.

"RECORD PRODUCTS EXTENSIVELY USED IN DEFENSE PROJECTS."

RECORD FOUNDRY & MACHINE COMPANY

LIVERMORE FALLS, MAINE, U. S. A.

J. Andersen & Company

21 East 40th Street

NEW YORK

Importers of Pulp

BLEACHED AND UNBLEACHED SULPHITE, KRAFT PULP AND GROUND WOOD

OBTAIN UNIFORMITY

of COLOR and CLEANLINESS in your PAPER with

D-I LESTOIL

. . . a powerful penetrating solvent oil detergent
. . . a wetting and cleansing agent.

1. **. . . in the kier boiler, hydro-pulper, washer or beater, it will thoroughly cleanse all impurities present in raw stock.**
2. **. . . highly effective for all grades of rags, cotton linters and cotton mill sweeps.**
3. **. . . de-inks newsprint, magazine and ledger papers.**

When used in the manufacturing process D-I LESTOIL keeps your system clean and your felts clean, soft and porous.

Laboratory or working samples furnished free upon request.

ADELL CHEMICAL COMPANY

Holyoke **Massachusetts**

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WHEN ORDERING FELTS

. . . Specify TENAX. There's a TENAX FELT to meet every specification, in making paper, board and allied products. Let TENAX bring you peak operating efficiency and greater economy!

LOCKPORT FELT COMPANY

NEWFANE, N. Y.

Serving the paper industry since 1891

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, November 6, 1946.

BLANC FIXE — Demand continues active as raw materials remain tight. Pulp is currently quoted at $40 per ton, in barrels, car lots, at works; the powder is currently quoted at $60 per ton, car lots, f.o.b. works.

BLEACHING POWDER — Shipments temporarily delayed due to drum shortage, supplies reported adequate to meet demand. Demand for export use reported steady. Quotations are unchanged. Prices on bleaching powder range from $2.50 to $3.10 per 100 pounds, in drums, car lots, at works.

CASEIN—Current prices on processed acid-precipitated casein are reported around 46 to 49 cents per pound for both domestic and Argentine grades; f.o.b. shipping point, with quantity not specified at the present time.

CAUSTIC SODA—Supplies tightest ever as market remains critical. Shipments are behind schedule as demand shows increasing strength. Cutback production further reduces stocks. Solid caustic soda is quoted at $2.30 per 100 pounds; flaked and ground is quoted at $2.70 to $3.95 per 100 pounds. All prices car lots.

CHINA CLAY—Supplies are becoming tighter as demand continues to increase for both domestic and English grades. Quotations remain unchanged. Domestic filler clay is currently quoted at from $8.50 to $9 per ton; coating clay is quoted at from $12 to $22 per ton, at mine. Imported clay is quoted at from $22 to $25 per long ton, ship side. All prices quoted in car lots.

CHLORINE — Demand continues to exceed output, market tight, stocks low. Tank car shortage delays shipments. Little or no improvement noted in container supplies. Chlorine is currently quoted at $1.75 to $2.00 per 100 pounds, in single unit tank cars, f.o.b. works.

ROSIN—Gum rosin in drums, per 100 pounds net, in yard, New York, B, $8.83; D. $8.83; E, $8.83; F, G, H, I, K, M, N and WG, $9.30; WW, $9.40. All prices in car lots, rosin in bags, 5c less.

SALTCAKE — Demand increasing with supplies showing some improvement. Prices remain unchanged. Domestic salt cake is quoted at $15 per ton in bulk, Chrome salt cake is quoted at $16 per ton. All prices in car lots, f.o.b. shipping point.

SODA ASH—Supplies continue short, demand active, previous orders filled. Voluntary plan of distribution now in operation. No indications of increased production exceeding demand seen for next year. Current prices, car lots, per 100 pounds, are as follows: in bulk, $.95; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Supplies are showing steady improvement. Previous orders filled. Boxcar shortage delays shipments. The pearl grade is quoted at $5.12 per 100 pounds; powdered starch at $5.27 per 100 pounds; both prices in bags, car lots, f.o.b. Chicago.

SULPHATE OF ALUMINA—Demand active, supply fair. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.20 per 100 pounds, in bags, car lots, f.o.b. works. The iron free is currently quoted at $1.75 to $2.00 per 100 pounds, in bags, at works.

SULPHUR—Domestic and foreign supplies favorable with increased shipments expected next year. Strong seasonal demand is reported with stocks plentiful. Annual contracts are quoted at $16 per long ton, f.o.b. mines; the price f.o.b. at Gulf Ports is $17.50 per long ton. Prices in car lots.

TALC — Domestic and French grades are moving in fair volume with prices steady. Domestic grades are currently quoted at from $16 to $30 per ton at mines; Canadian at $35 to $45 per ton. All prices on car lots.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March, 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—
Roll, contract ....$84.00 @ —
Sheets ..... 93.00 @ —

Kraft—per cwt.—Carload Quantities
Zone A, Delivered
Superstandard Wrapping .....*$5.25 @ —
No. 1 Wrapping.. *5.00 " —
Standard Wrapping*4.75 " —
Standard bag.....*4.75 " —

* Prices for Standard Wrapping are for 40 lb. base weight; for Stndard Bag for 30 lb. base weight.

Tissues—Per Ream 24x36 (480) 10 lb. Zone 1.
Wh. No. 1 Frd. ... 1.10 @ 1.20
Wh. No. 1 M. G. .. 1.10 @ 1.20
Wh. No. 1½ ..... .95 @ 1.10
Wh. No. 2 ..... 1.00 @ 1.10
Wh. Anti-Tar. .... 2.25 @ 3.50
Kraft Unbl. ..... 1.15 @ 1.25
Manila No. 2 ..... .90 @ 1.05

Toilet—Per Case of 100 rolls 1 M Sheets.
Unbleached ..... 4.47 @ 5.50
Bleached ..... 6.50 " —

Paper Towels — Per Case of 3750 Zone 1.
Wh. C. fold 11x13½ 4.09 @ —
Br. Sgl. fold 10 in. 2.37 " 2.48
Br. M'tif'd 9½x14¾ 3.48 " —
Br. M'tif'd 9½x9¾ 2.37 " 2.48

Manila—per cwt.—C. l. f. a.
No. 1 Jute .....11.25 @ —
No. 1 Manila 35 lb. 6.00 " 7.00

Boards, per ton—
News .....*59.00 @ —
Chip .....*58.00 @ —
Sgl. Mla. L1. Chip*67.00 @ —
White Pat. Coated*86.00 @ —
Kraft Liners 50 lb.*74.00 " —
Binders Boards... 84.00 " 116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—White, Assorted Items

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.75 @ $46.75	$40.90 @ $48.00
100% Rag.	32.85 " 38.50	34.00 " 40.00
85% Rag	.... "	30.55 " 38.75
75% Rag	24.30 " 28.50	24.45 " 30.00
65% Rag	.... "	.... " ....
50% Rag	20.05 " 24.50	21.25 " 25.75
25% Rag	17.85 " 21.75	19.00 " 23.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers.. White, Assorted Items

	Bonds	Ledgers
No. 1	$12.00 @ $14.50	$13.15 @ $16.00
No. 2	11.25 " 13.75	12.25 " 15.00
No. 3	.... "	.... " ....
No. 4	10.60 " 13.00	11.75 " 14.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper

No. 1 Glossy Coated..	$14.70 @ $16.75
No. 2 Glossy Coated..	13.75 " 15.50
No. 3 Glossy Coated..	13.20 " 16.00
No. 4 Glossy Coated..	12.80 " 14.30
No. 1 Antique (Watermarked)	11.35 " 12.75
No. 2 Offset	10.65 " 12.25
A Grade E. F.	10.60 " 12.00
A Grade S. & S. C. ..	11.00 " 12.50
B Grade E. F.	10.30 " 11.75
B Grade S. C.	10.70 " 12.25
C Grade E. F.	10.00 " 11.50
C Grade S. C.	10.40 " 12.00
D Grade E. F.	9.70 " 11.00
D Grade S. & S. C. ..	10.10 " 11.50

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers' Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$103.50
Unbl. Softwood Sulphite	90.00
Bl. Hardwood Sulphite	100.50
Unbl. Hardwood Sulphite	87.50
N. Bleached Sulphate	103.50
S. Bleached Sulphate	97.00
N. Semi-Bleached Sulphate	98.00
S. Semi-Bleached Sulphate	91.50
N. Unbl. Sulphate	83.50
S. Unbl. Sulphate	76.50
Bleached Soda	93.50
Unbleached Soda	88.00
Groundwood	64.00
Ground—Machine Dried	67.00
Sulphite Screenings	50.00
Sulphate Screenings	44.00
Groundwood Screenings	37.50
N. Unbl. Sulphate Siderums	83.50
S. Unbl. Sulphate Siderums	76.50
Standard Newsprint Siderums	64.00

Transportation Allowances

Applying to Producers of Wet Weight Pulp.

	Below 50% Air Dry Weight
Northeast	$12.50
Lake Central	12.50
Southern	15.00
West Coast (in area)	9.50
West Coast (out area)	15.50

	50%-80% Air Dry Weight
Northeast	$10.50
Lake Central	10.50
Southern	13.00
West Coast (in area)	8.50
West Coast (out area)	14.50

Applying to Producers of Dry Weight Pulp.

	Above 80% Air Dry Weight
Northeast	$7.50
Lake Central	7.50
Southern	10.00
West Coast (in area)	6.50
West Coast (out area)	12.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum price.

New Domestic Cotton Cuttings

(Ceiling prices delivered Mill Plus Dealer's Commission)

	Per 100 lbs.
White Shirt	$7.25
Light Silesias	5.75
Unbleached Muslin	7.50
White Back Blue Overalls	5.75
Blue Overalls	5.50
Unbl. Fancy Shirt	3.50
Light Percales	4.75
Light Prints	4.50
Washables	3.00
Bleachable Khaki	4.25
Unbleachable Khaki	3.50
Cottonades	3.25

THE WILLIAMS PAPER MOISTURE TESTER
STILL THE MOST RAPID AND ACCURATE KNOWN MEANS FOR THE CONTROL OF MOISTURE IN PAPER AND BOARD.

More Than 500 In Use In Leading Paper Mills And Laboratories.

Builders of Control Instruments for 25 Years.

- Pulp Testing Ovens
- Freeness Testers
- Electric Centrifuges
- Pebble Mills
- Chip Classifiers
- Sheet Moulds
- Laboratory Presses
- A.S.T.M. Penetration Testers
- Smoothness Testers

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19 Park Place — Watertown, N. Y.

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ORISKANY, N. Y.

Manufacturers of

WATERBURY FELTS

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PAPER MILL AND PAPER BAG MACHINERY SINCE 1828

For the manufacture of high grade paper and paper products to meet the ever increasing and exacting demands for higher production and lower costs.

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SOUTH WINDHAM • CONNECTICUT

PATENTED "SHAF-TITE" CONSTRUCTION

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ROLLS
Mean
STRONGER
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due to patented features
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324 St. Paul St., Rochester 5, N. Y.

Mfrs. of Engraved Embossing Rollers and Plates of Any Type and Description
Worn Rollers Re-Engraved.

Complete Designing and Engineering Service

ENGLISH ECCO CLAYS **CLAYS**

UNIFORM SUPERIOR DEPENDABLE

English China Clays Sales Corporation
551 Fifth Avenue, New York City

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.
No. 1 Whites Repacked	$3.80
No. 1 Whites Miscellaneous	3.20
No. 2 Whites Repacked	2.90
No. 2 Whites Miscellaneous	2.65
Blue Overalls	2.50
Thirds and Blues Repacked	2.20
Thirds and Blues Miscellaneous	1.30
No. 1 Roofing Rags	1.55
No. 2 Roofing Rags	1.45
No. 3 Jute Bagging	1.35
No. 4 Brussels and hard back carpets	1.35
No. 5A Roofing Rags	1.35

New Foreign Cotton Cuttings

(Prices delivered Mill)

	Per 100 lbs.
New Dark Cuttings	$6.00 to ....
New Mixed Cuttings	6.50 " ....
Light Silesias	9.00 " 10.00
Light Flannelettes	8.00 " 9.00
New White Cuttings	13.00 " 15.00
Fancy Shirt Cuttings	9.00 " 10.00
Light Prints	8.00 " 10.00
Bleachable Khaki, No. 1	7.00 " 7.50
Unbl. Khaki, No. 1	6.25 " 6.75

Old Foreign Rags

(F.O.B. New York)

	Per 100 lbs.
No. 1 White Linens	$14.00 to 16.00
No. 2 White Linens	12.00 " 13.00
No. 3 White Linens	8.00 " 9.00
No. 4 White Linens	8.00 " 9.00
No. 1 White Cottons	10.00 " 12.00
No. 2 White Cottons	8.00 " 9.00
No. 3 White Cottons	6.50 " 7.00
No. 4 White Cottons	5.00 " 5.50
Extra Light Prints	7.50 " 8.00
No. 1 New Light Prints	6.25 " 6.75
Med. Light Prints	5.25 " 5.75
Dutch Blue Cottons	5.25 " 5.50
Checks and Blues	4.00 " 4.25
Linsey Garments	4.50 " 5.00
Dark Cottons	3.75 " 4.00
Old Shopperies	3.25 " 3.50
New Shopperies	3.25 " 3.50

BAGGING

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny, No. 1	$4.75 to 5.00
Domestic Gunny, No. 1	4.25 " 4.50
Light Wool Tares	4.50 " 4.75
Heavy Wool Tares	4.75 " 5.00
Bright Bagging	4.25 " 4.50
Foreign Manila Rope	6.00 " 7.00
Domestic Manila Rope	5.75 " ...
Jute Strings	4.50 " 5.00
No. 1 Sisal Strings	4.00 " 4.50
Mixed Strings	1.75 " ...

Waste Paper

Ceiling Prices to Mills

(Dollars Per Ton)

F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	$67.50	● —
No. 1 Hard White Envelope Cuts	62.50	" —
No. 1 Hard White Shavings, unruled	57.50	" —
No. 1 Hard White Shavings, ruled	50.00	" —
Soft White Shavings, one cut	57.50	" —
No. 1 Soft White Shavings	50.00	" —
Soft White Shavings, Misc.	43.00	" —
No. 1 Fly Leaf Shavings	33.50	" —
No. 2 Fly Leaf Shavings	22.50	" —
No. 1 Groundwood Fly Leaf Shavings	25.00	" —
No. 2 Mixed Groundwood Fly Leaf Shavings	18.50	" —
Mixed Colored Shavings	15.50	" —
Mixed Groundwood Colored Shavings	18.00	" —
Overissue Magazines	33.50	" —
No. 1 Heavy Books & Magazines	38.50	" —
Mixed Books	22.00	" —
No. 1 White Ledger	46.00	" —
No. 2 Mixed Ledger, colored	40.00	" —
New Manila Envelope Cuttings, one cut	57.50	" —
New Manila Envelope Cuttings	53.00	" —
Extra Manilas	39.00	" —
Mixed Kraft, Env. & Bag Cuttings	55.00	" —
Kraft Envelope Cuttings	65.00	" —
Triple Sorted, No. 1 Brown Soft Kraft	50.00	" —
New 100% Kraft Corrugated Cuttings	45.00	" —
No. 1 Assorted Old Kraft	35.00	" —
New Jute Corrugated Cuttings	18.50	" —
Old 100% Kraft Corrugated Containers	35.00	" —
Box Board Cuttings	14.50	" —
White Blank News	33.00	" —
Overissue News	22.00	" —
No. 1 News	20.00	" —
No. 1 Mixed Paper	19.00	" —
Old Corrugated	28.00	" —
Mill Wrappers	22.00	" —

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—		
India	.26	● —
White Hemp	.26	" —
Fine Polished—		
Fine India	.31	" —
Unpolished—		
Box	.28¼	" —
Paper Makers	.28	" —
Tube Rope	.22	" —
Wall Paper	.23½	" —
Wrapping	.26	" —
Soft Fiber Rope	.22	" —
Cotton	.28	" —
(Hard Fiber)		
Medium Java	.23	" —
Mex. Sisal	.21	" —
Manila	.33	" —

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¾
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¾
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¾
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¾

Domestic Rags (Old)

White No. 1—Repacked	3.80	● —
Miscellaneous No. 1	3.20	" —
Miscellaneous No. 2	2.65	" —
White No. 2—Repacked	2.90	" —
Thirds and Blues—		
Miscellaneous	1.80	" —
Repacked	2.20	" —
Black Stockings—		
(Export)	Nominal	
Roofing Stock—		
Foreign No. 1	Nominal	
Domestic No. 1	1.55	" —
Domestic No. 2	1.45	" —
Roofing Bagging	1.35	" —
Old Manila Rope	5.75	" —

Bagging

(F. o. b. Phila.)

Gunny No. 1—		
Foreign	Nominal	
Domestic	3.00	● 3.50
No. 1 Clean Bright—		
Sisal Strings	.04	" —
No. 2 Clean Bright—		
Sisal Strings	.03	" —
Sisal Jute	.02½	" .02¾
Scrap—		
No. 1	3.25	" 3.50
No. 2	1.75	" 1.80
Wool Tares, heavy	4.00	" 4.25
No. 1 New Light Burlap	3.00	" 4.00
New Burlap Cuttings	3.75	" 4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	● —
No. 1 Hard White Shavings, unruled	2.87½	" —
Soft White Shavings, one cut	2.50	" —
White Blank News	1.65	" —
Soft White Shavings, Misc.	2.13	" —
No. 1 White Ledger	2.30	" —
No. 2 Ledger, colored	2.00	" —
No. 1 Heavy Books & Magazines	1.92½	" —
Overissue Magazines	1.67½	" —
New Manila Envelope Cuttings	2.65	" —
No. 1 Assorted Old Kraft	1.75	" —
No. 1 Mixed Paper	.95	" —
Box Board Cuttings	.72½	" —
Kraft Corrugated Cuttings	2.25	" —
Old Corrugated Containers	1.40	" —
Overissue News	1.00	" —
No. 1 News	1.00	" —

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	● —
No. 1 Hard White Shavings, ruled	2.50	" —
Soft White Shavings, Misc.	2.15	" —
No. 1 Fly Leaf Shavings	1.67½	" —
No. 2 Fly Leaf Shavings	1.12½	" —
No. 1 Groundwood Fly Leaf Shavings	1.25	" —
No. 2 Groundwood Fly Leaf Shavings	.90	" —
Mixed Colored Shavings	.75	" —
New Manila Envelope Cuts, one cut	2.87½	" —
Hard White Envelope Cuts, one cut	3.37½	" —
Triple Sorted No. 1 Brown Soft Kraft	2.50	" —
Mixed Kraft Env. & Bag Cuttings	2.75	" —
Kraft Envelope Cuttings	3.25	" —
No. 1 Heavy Books & Magazines	1.92½	" —
New Manila Envelope Cuts, one cut	2.87½	" —
New Manila Envelope Cuttings	2.65	" —
White and Colored Tabulating Cards	2.25	" —
Ground Wood Tabulating Cards	1.35	" —
White Blank News	1.65	" —
No. 1 Assorted Old Kraft	1.75	" —
No. 1 Mixed Paper	.95	" —
Overissue News	1.10	" —
Box Board Cuttings	.72½	" —
New Corrugated Cuttings, Kraft	2.25	" —
Old 100% Kraft Corrugated Containers	1.75	" —
Old Corrugated Containers	1.40	" —
Jute Corrugated Cuttings	1.07½	" —

Bagging

(F. o. b. Boston)

Gunny Bagging—		
Foreign	(nominal)	
Domestic	2.75	● 2.90
Sisal Rope No. 1	*4.75	" —
Sisal Rope No. 2	* —	" 4.00
Mixed Rope	1.60	" —
Transmission Rope—		
Foreign	(nominal)	
Domestic	2.75	" 3.00
Manila Rope—		
Foreign	(nominal)	
Domestic	5.75	" —
Soft Jute Rope	4.50	" 5.00
Jute Carpet Threads	3.00	" 3.50
Bleachery Burlap	8.50	" 9.00
Scrap Burlap—		
Foreign	(nominal)	
Domestic	3.00	" 3.25
South America	—	" 3.25
Wool Tares—		
Foreign	(nominal)	
Domestic	4.25	" —
Aust. Wool Pouches	—	" 3.61
New Zealand Wool Pouches	—	" 3.30
New Burlap Cuttings	4.75	" 5.00
Heavy Baling Bagging	4.00	" 4.25
Paper Mill Bagging	2.50	" 3.00
No. 2 Roofing Bagging	1.35	" —

* OPA Maximum Prices.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—		
New Light Prints	.04½	● .04¾
Fancy Percales	.04¼	" .04
New White No. 1	.06¼	" .07
New Light Flannelettes	.05½	" .06
Canton Flannels, Bleached	.06	" .06¾
Underwear Cutters, Bleached	.06¼	" .06¾
Underwear Cutters, Unbleached	.05¼	" .06
Silesias No. 1	.06	" .06¾
New Black Silesias	.03	" .03¾
Red Cotton Cuttings	.03½	" .04
Soft Unbleached	.06½	" .06¾
Blue Cheviots	.05½	" .06
Fancy	.02¾	" —
Washable	.02¾	" —
Khaki Cuttings	.02¾	" .03
O. D. Khaki	.03½	" .03¾
Corduroy	.03¼	" .03¾
New Canvas	.06¼	" .06½
B. V. D. Cuttings	.06¼	" .06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—Repacked	3.80	● —
Miscellaneous	3.20	" —
White No. 2—Miscellaneous	2.65	" —
Twos and Blues, Repacked	2.20	" —
Old Blue Overalls	2.25	" 2.30
Thirds and Blues, Repacked	2.20	" —
Miscellaneous	1.80	" —
Black Stockings	3.50	" 4.00
Roofing Stock—		
No. 1	1.55	" —
No. 2	1.45	" —
No. 3	1.35	" —
No. 4	1.35	" —
No. 5, Quality A	1.35	" —
Quality B	1.20	" —
Quality C	.95	" —
Old Manila Rope	5.75	" —

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

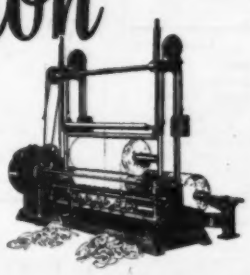
OPA Maximum Prices, Baled

Shavings—		
No. 1 Hard White Envelope Cuts, one cut	3.37½	● —
No. 1 Hard White Shavings, unruled	2.87½	" —
No. 1 Soft White Shavings	2.50	" —
No. 1 White Ledger	2.30	" —
No. 1 Heavy Books & Magazines	1.92½	" —
White Blank News	1.65	" —
Mixed Kraft Env. & Bag Cuttings	2.75	" —
No. 1 Assorted Old Kraft	1.75	" —
Overissue News	1.10	" —
No. 1 News	1.00	" —
No. 1 Mixed Paper	.95	" —
No. 1 Roofing Rags	1.55	" —
No. 1 Roofing Bags	1.45	" —

H. M. SPAIN & CO.
COMMERCIAL FORESTERS
COMMERCE TITLE BUILDING
MEMPHIS, TENN.

Langston
SLITTERS AND ROLL WINDERS

are accurately machined and balanced for high-speed operation. You get "custom tailored" finished rolls.



SAMUEL M. LANGSTON COMPANY, CAMDEN, NEW JERSEY

Mill Cogs
ON SHORTEST POSSIBLE NOTICE

We make all kinds of Mill Cogs and have special facilities that will be of great service to you. We make a specialty of "ready dressed" cogs which are

READY TO RUN

the moment driven and keyed. Write at once for circular "G" and instruction sheets free.

THE N. P. BOWSHER CO.
South Bend, Ind.
Established 1882

AMYLIQ
for superior coatings and tub-sizings from starch

WALLERSTEIN COMPANY, INC.
180 Madison Avenue, New York 16

THE McPHERSON COMPANY
GREENVILLE · SOUTH CAROLINA

Industrial Engineers

INDUSTRIAL SURVEYS · PLANT SITE INVESTIGATIONS · PLANS
COMPLETE PLANT DESIGNS · APPRAISALS · VALUATIONS · LABOR
SAVING STUDIES · RESEARCH & REPORTS · PROCESS ANALYSIS

K-121-B — DEINKING — DECOLORIZING and COOKING PROCESSES — K-C-2

THE KINSLEY CHEMICAL COMPANY
12500 Berea Road — Cleveland, Ohio

THE MAYER MACHINE COMPANY, INC.
Manufacturers of
Paper Coating Machines
1155 Scottsville Road, Rochester 11, N. Y.
Winding & Oiling, Carbon, Laboratory, Flat Room Converting and Measuring and Roadmarking.

GET FACTS!!
CAMACHINE 18, a *fast* winding unit for shipping, bag, board and counter rolls, etc. Produces perfect rolls right off the end of the paper machine. Keeps well ahead of the fastest paper or board machine.

WRITE FOR THIS FOLDER

CAMERON MACHINE COMPANY 61 POPLAR STREET, BROOKLYN 2, N. Y.

The CLEARING HOUSE

Address replies to advertisements appearing under Box numbers in care of PAPER TRADE JOURNAL, 15 West 47th Street, New York 19, N. Y.

Copy for Classified Advertisements must be in our office on Monday preceding publication

HELP WANTED

CHARLES P. RAYMOND SERVICE, Inc.
294 Washington St., Boston, Mass.
Specializing in Paper Mill Personnel
Positions Now Open.

Assistant mill manager, technical graduate, experienced in business administration, accounting, etc.
Chief electrician and chief engineer $4,000-$4,500 (Pennsylvania)
Assistant superintendent Fourdrinier machine Mid-West $300-450 month
Boss machine tender Fourdrinier machine $250-$350 month, Mid-West
Control Chemist $4,000-6,000
POWER PLANT SUPERVISOR (South) $80-$90
Plant Engineer (Canada) $400 month
Tour boss Fourdrinier machine West Coast $4,450 year
Beater engineer for Mexico
Cylinder machine tender (Pennsylvania)
And many others

We invite correspondence (Strictly Confidential) with paper and pulp mill executives seeking new positions and with employers seeking new personnel. N-7

CHEMIST

Our paperboard mill, specializing in the manufacture of folding grades, is seeking an experienced chemist to assist in controlling formulae and improving our quality. An exceptional opportunity is offered to the right man. In your reply give complete background of experience and your desired compensation. Address Box 46-783 care Paper Trade Journal. N-21

WANTED
SALES ENGINEER

Chance for advancement for the right man in paper machinery and manufacturing. Let's talk over salary and profit participation. Kurt Wandel—Paper Machinery—Honey Brook, Pa. N-21

MECHANICAL ENGINEER OR MACHINE DESIGNER

For development engineering division of well established S.E. Pa. company. Must be experienced in design of paper manufacturing and processing machinery. Advise age, education, experience and salary requirements. Address Box 46-785 c/o Paper Trade Journal. N-7

PAPER EMBOSSING DEPT. FOREMAN

Excellent opportunity offered to experienced operator on Waldron or similar Paper Embossing equipment, to be Foreman in southern paper mill. Write, giving full details of experience, age, salary required. Box #46-762 care Paper Trade Journal. N-14

WANTED—TOUR FOREMAN

IMMEDIATE OPENING FOR A TOUR FOREMAN WORKING ROTATING SHIFTS.
ONE M. F. PICKUP AND ONE YANKEE PICKUP FOURDRINIER TISSUE MACHINES ARE OPERATING AT PRESENT. A THIRD HIGH SPEED TISSUE MACHINE WILL BE IN OPERATION IN LATE 1947.
WE PREFER A MAN 30-40 YEARS OF AGE WITH SOME TECHNICAL BACKGROUND. EXPERIENCE ON HIGH SPEED TISSUE MACHINES MAKING BOTH FLAT AND CREPED PAPERS DESIRABLE.
SEND COMPLETE RESUME GIVING EDUCATION AND EXPERIENCE TO
FERNSTROM PAPER MILLS, INC.
Pomona, California D-26

HELP WANTED

PAPER MAKER—COLLEGE GRADUATE

Experienced on Machines With Some Engineering Ability. Under 40.

STOCKPORT PAPER CORPORATION
Stockport, New York, Tel.: Hudson 755J3
N-21

SALARIED POSITIONS

$2,500-$25,000. This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
117 Dun Bldg., Buffalo 2, N. Y.

MACHINE DESIGNER:—Graduate Mechanical Engineer or equivalent. Should have experience with web printer and bag making machinery. Permanent position in large midwestern plant manufacturing printed and converted food packages. Real opportunity for one who has creative ability. Reply to Box 46-738 care Paper Trade Journal. N-14

WANTED—Experienced Master Mechanic for board mill in New England. State experience, salary and availability. Address Box 46-742 care Paper Trade Journal. N-7

GUMMING SUPERVISOR—Wanted by large well established paper converter. Should have practical experience in production of gummed paper and cloth tapes and gummed specialty papers. Give full details of qualifications and experience. Address Box 46-612 care Paper Trade Journal. D-19

WANTED—Progressive Mill with expansion program under way is in need of a man familiar with the receiving and handling of paper stocks and pulps used in the manufacture of Folding Boxboards. Excellent opportunity for the right man. Address Box 46-746 care Paper Trade Journal. N-14

SALES AND SERVICE ENGINEER to call on trade regularly at least every three months to check on operation of pulp and paper mill equipment for maintenance, sales of repair parts, etc. Must have had shop and mill experience. Address Box 46-757 care Paper Trade Journal. N-7

CHEMIST OR CHEMICAL ENGINEER — New York City location. Young man, preferably with training and some experience in pulp and paper making for laboratory and development work in semi-chemical pulping. Send complete information in first letter. Address Box 46-760 care Paper Trade Journal. N-21

WANTED—PAPER MILL MECHANIC who has had experience setting up paper machines and beaters. Good opportunity for capable man to work into permanent position as plant engineer for small tissue mill located in Southern New York State. Address Box 46-782 care Paper Trade Journal. TF

TECHNICAL PERSONNEL with experience in paper converting. Requires thorough knowledge of printing coating and laminating. Program is both control and product development. Expanding organization. State qualifications fully. Address Box 46-780 care Paper Trade Journal. N-14

WANTED—AN EXPERT ELECTRICIAN AND ASSISTANT ELECTRICIAN. STEADY WORK IN A NICE PLANT. ADDRESS BOX 46-772 CARE PAPER TRADE JOURNAL. N-14

EXPERIENCED PAPER MILL ENGINEER, with knowledge of general engineering work, in long established consulting engineer's office specializing in pulp, paper mills and power plants. Location Manhattan. Excellent opportunity for right man. State complete details, age, experience, availability and salary desired. Address Box 46-779 care Paper Trade Journal. N-21

HELP WANTED

REQUIRED FOR PERMANENT EMPLOYMENT in Newfoundland, Graduate Mechanical or Civil Engineer for development and general engineering work for woods operations, involving an annual cut of 600,000 cords of pulpwood. Good salary and opportunity for qualified engineer. Applications should be sent to Bowater's Newfoundland Pulp and Paper Mills, Limited, Corner Brook, Newfoundland. N-21

WANTED—Working Master Mechanic. General all around machinist and millwright for mill in midwest. State experience, salary and availability. Address Box 46-769 care Paper Trade Journal. N-7

SITUATIONS WANTED

SPECIALIST

From paper machines on thru the various finishing and shipping operations. Planning, routing, scheduling, increased output, lower costs and waste. Would like contact company with one or more mills that can stand a lot of improvement.

Address Box 46-787 care Paper Trade Journal. N-21

CHEMIST
College Graduate

With 10 years experience in operations in Rag pulp mills and in bank note, bond, carbon, cigarette, stationery and resin treated papers. Special studies and operation on cooking, bleaching and stock preparation of cotton, hemp and flax fibers. Familiar with stationery converting problems. At present employed but desire position with future. Foreign positions acceptable. Available for personal interview within reasonable distance. Address Box 46-737 care Paper Trade Journal. N-7

PLANT MANAGER—Thorough experience in converting paper and boards; wants change to position offering better opportunity. Excellent production and labor relations background. Address Box 46-694 care Paper Trade Journal. N-28

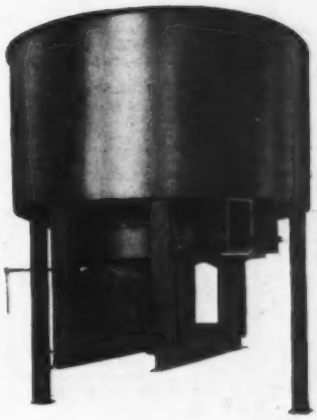
MANAGER — Controller etc. can handle all phases of the raw stock or converting end of the paper business. Address Box 46-734 care Paper Trade Journal. N-7

POSITION WANTED—General Superintendent or Superintendent. Can produce quantity with quality on cylinder products. Understand present day personnel relations for highest efficiency. Training covers technical as well as the practical. Address Box 46-767 care Paper Trade Journal. N-7

AVAILABLE. Experienced standard cost accountant. Specialist sulphate pulp mill. Presently employed but seeking improved living conditions. Full details of offer in first instance to Box 46-770 care Paper Trade Journal. N-14

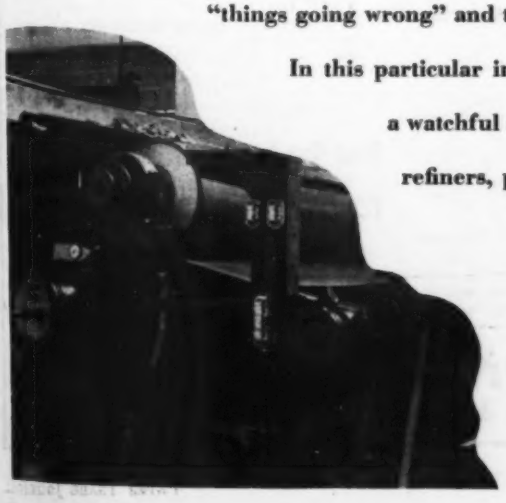
CLASSIFIED ADS
BRING RESULTS

IT PAYS TO BE OFFSIDE



Not in a football game when you draw a penalty. Absolutely yes, when you *beat the need* and discard a faulty or worn machine or part and order repairs ahead of a threatened breakdown. ● It pays to be on the lookout for "things going wrong" and take early action.

In this particular industry it pays to keep a watchful eye on your screen plates, jordans, refiners, press rolls, drives or anything else subject to wear.



● *When ordering replacements, make the order specific to avoid correspondence and delays.*

SHARTLE BROS.

MIDDLETOWN, OHIO

DILTS MACHINE WORKS, FULTON, NEW YORK

Divisions of The Black-Clawson Co., Hamilton, Ohio

Associate: ALEXANDER FLECK LIMITED, OTTAWA, CANADA

FOR SALE

FOR SALE

1—12-plate Dunbar screen

1—112" Seybold knife grinder

1—Lobdell roll grinder

1—12x6 Warren open impeller centrifugal pump, 1500 GPM, 75' head

Shartle Bros. Machine Co.
Middletown, Ohio

N-14

FOR SALE

GOOD VALUES FOR THE PAPER MILL

68" Rice, Barton, Fales Slitter-Rewinder.
80" and 110" Mill Type Sheeters.
34" Inman Slitter.
54" Brown & Carver Power Cutter.
72" Cameron Rewinder.
36" Burton Slot-hole Perforator.
2—14" x 22" John Thomsons.
Robinson Double Corner Cutter.
American heavy duty Cross-Cut Saw.
Baling Presses—NEW—Hand and Power.

THOMAS W. HALL COMPANY, INC.
120 West 42nd St., New York 18

FOR SALE—2 Quadruple Effect Vertical Body Evaporators for caustic liquors; 2—7½" dia. x 65' long Rotary Dryers. Priced right for quick sale. Write for detailed specifications. BRILL EQUIPMENT COMPANY, 225 West 34th Street, New York 1, N. Y. N-7

FOR SALE

FOR SALE

PAPER MACHINE STEAM TURBINE DRIVE

230 H.P. Terry GA Turbine and Gear connected to 24" diameter pulley all on one solid base. Steam inlet 190 pounds. Back Pressure 35 pounds.
With Woodward Governor for speed control through wide range.
This unit is in excellent mechanical condition and a fine buy for anyone needing a paper machine drive for immediate shipment.

FERNSTROM PAPER MILLS, INC.
POMONA, CALIFORNIA TF

FOR SALE—One Meisel Press, Factory No. 418. Reconditioned. Can be inspected in Chicago. Write: Tomahawk Kraft Paper Co., Tomahawk, Wisconsin. N-7

FOR SALE—Cellophane. Available in small cut size sheets, either moistureproof or plain. Fairly prompt delivery. Address Box 46-603 care Paper Trade Journal. TF

FOR SALE

BEATERS
1—2000 lb. Holyoke-Iron Tub Beater.
8—1200 lb. E. D. Jones (no tubs).
1—1000 lb. Dayton Beater (no tub).
1—400 lb. Gavit—iron tub beater.
1—Breaker Beater—Dilts Bandless Roll 62" diameter x 54" face—70 tons daily capacity. Equipped with Shartle Bros. Ragger.

BLOWERS
2—Buffalo Forge Company—Size 7—Duplex Conoidal steel plate Blowers. Ball bearing.

CALENDER STACKS
1—5 roll 84" face—Farrel.
1—6 roll—72" face.
1—7-roll 36" Holyoke Machine (supercalender.
1—2 roll 24" laboratory calender stack.

CENTRAP
1—Shartle Brothers Centrap.

COATING MACHINE
1—26" six roll coating machine

CREPING MACHINE
1—86" Waldron Creping Machine, practically new.

CYLINDER MOULDS
1—30" diameter x 74" face.
2—30" diameter x 54" face.
1—30" diameter x 75" face.
1—36" diameter x 84" face.
1—36" diameter x 80" face.
2—36" diameter x 72" face.
4—30" diameter x 72" face.

DOCTORS
14—Dillon Doctors—complete with accessories—98" face.

DRIVES
1—40 h.p. Bagley & Sewall, enclosed drive (New 1942).
2—30 h.p. Downingtown, enclosed drive, ratio 6 to 1.
1—Cleveland Worm Drive, Ratio 10 to 1, New.
4—Smith & Winchester mortise gear Drives.
1—Moore & White mortise gear drive.
1—D. O. James 75 H.P. Speed Reducer with couplings and motor base. Ratio 2.16 to 1. 900 RPM.
1—#7½ Reeves.

DRYERS
16—36" diameter x 115" face.
1—28" diameter x 76" face.
1—48" diameter x 94" face.
1—24" diameter x 84" face. (Baby).
2—36" diameter x 64" face, with frames gears and bearings.
2—25" x 120" (Baby Dryers).
1—48" x 100".
1—36" diameter x 38" face.
5—48 x 72.
2—76 x 74.
2—36 x 76. (Bronze).
1—24 x 74 (Stainless steel).
3—24 x 72 (Copper face, textile type).
1—24 x 70 (Baby dryer).

ERKENSATORS
2—I. W. E. Erkensators—bronze construction—complete with motors, starters and distributing box.

FLAT SCREEN
1—4 plate Flat Screen.

HYDRAULIC PRESSES
1—Lake Erie Engineering Co., 78 ton, platen 12" x 12".
1—Watson Stillman, 60 ton, platen 14" x 14", with triplex pump and motor.

JORDANS
1—#2 Emerson, with 125 h.p. motor.
2—Noble & Wood, Pony Monarch, Belt Driven.
1—No. 9 Emerson Jordan—for direct connection to a motor.
1—Noble and Wood, Monarch, new fillings.

LIGHTER BAR LIFT
3 sets Hydraulic Lighter Bar Lifts, with pumps.

MOTOR
1—25 h.p. motor, including starting equipment.

PULLEYS
Various cone and assorted pulleys.

PULP EQUIPMENT
1—32" three pocket Glens Falls Grinder (for 27" wood).

PULP SCREEN
1—IMPCO centrifugal pulp screen design No. 3.

PULPER
1—Jones Pulper.

PULVERIZER
1—Erie coal pulverizer.

PUMPS
1—Buffalo Pump—5500 g.p.m. direct connected to 100 H.P. Motor (50' head).
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.
4—Vertical Schutte & Koerting Acid Pumps (with motors).

RAG CUTTER
1—#20 Taylor, Stiles & Co.

REELS
1—72" Downingtown Expansion Reel.
1—2 Bowl Reel — 112" face — bowls 20" diameter.
1—2 Bowl Reel—110" face.

ROLLS
500—Brass tube—steel tube—rubber covered iron rolls—various sizes.

ROTARY SCREENS
3—Moore & White Rotary Screens (alternating diaphragm type).

ROTARY SCREENS
2—#2 Bird Screens (copper vats).

SAVEALL
1—Saveall 36" diameter x 96" face cylinder mold. (With iron end vat.)
1—#5 Bird Saveall.

SCREEN PLATES
36 plates—43 x 11⅛"—.030 cut—bevel edges.
24 plates—Recently recut .008.
12 plates—Recently recut .035.
Also other sizes and cuts in stock.

SHREDDERS
1—No. 25 CRSE Mitts & Merrill Hog.
1—Gilman Shredder.
1—Waterville Shredder.

SHEETERS
1—128" Moore & White Sheeter with layboy.
1—48" Langston heavy duty chopper (this is a combination machine, combining a slitter, scorer, sheeter and chopper.)

SLITTERS AND WINDERS
1—72" Langston.
1—36" Beck Razor Blade type Slitter & Winder.
1—60" Moore & White Slitter and Winder set for ¼" slits.
1—60" Moore & White Slitter and Winder set for 7/16" slits.
1—120" Moore & White 4 drum slitter.
2—32" Cameron, Type 6.

STOCK PUMPS
1—7¾ x 12 duplex Moore & White.
1—12 x 20 Triplex Shartle.
1—10 x 12 open impeller. (All lead).
5—Goulds Centrifugal Stock Pumps, 4 x 6, ball bearing.
Numerous other Centrifugal Stock Pumps Advise us to your requirements.

SUCTION BOX
1—Nash 100" face Suction Box.

SUCTION FELT ROLLS
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1—Rotary Cooker—6' dia. x 21' long—complete with drive.

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2—Beloit 8' dia. x 173" face—75# working pressure.
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1—75 H.P. Variable Speed—Type G. R.P.M. 3850—90# Steam Pressure 15# Back Pressure—Type O Gear Box—Pinion 3850 R.P.M.—Gear 655 R.P.M.

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6—Beloit 14 & 63 teeth
7" face C O mortise gears
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1—8 ft. x 86"
2—8 ft. x 175"
1—6 ft. x 102"
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Rice Barton anti friction equipped
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2—Jones with Falk reducers and motors 440 volts 3 ph sixty cycle
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1—Moore & White sorting table
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1—20" face cast iron tapered pulley—2 15/16" Bore, Taper 31"-29½".
2—20" face cast iron tapered pulley—3 7/16" Bore, Taper 31"-30".
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2—Steel split pulleys 60" diameter by 31" face —5 15/16" bore.
1—Cast iron split pulley—60" diameter by 21" face by 3½" bore.
1—Cast iron split pulley—40½" diameter by 21" face by 3½" bore.
1—Cast iron split pulley—84" diameter by 36" face by 5 15/16" bore.
1—Cast iron split pulley—72" diameter by 18" face by 10" face by 8⅝" bore.
2 —Steel split pulleys—60" diameter by 41" face by 5 15/16" bore.
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1—Tapered cast iron split pulley. Taper 30" to 28½" by 20" face by 3 15/16" bore.
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1—9" diameter x 88" Face Calender roll—8" diameter journals.
12—6½" dia. x 92" face steel drier felt rolls with 1 7/16" x 6½" Journals.
2—4" Gould centrifugal stock pumps with 2 vane open impeller. Capacity 600 G.P.M. at 40' head—1175 R.P.M. with 10 H.P. Operated less than two years.
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1 Westinghouse Induction Motor type CS 375 HP 2300 volts 3 phase 60 cycles 97 amp. 360 RPM Ser. #1463196 complete with one control panel, including one Westinghouse 300 amp. OH Circuit Panel.

1 set Disconnect Switches.

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1—G.E. Motor DC 7.5 HP 230 volts 30.2 amp 850 RPM Type RC-29A Form A29 Ser. #1148541.

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1—Westinghouse DC Motor Type S 5 HP 220 volts 21 amp. 1300 RPM Ser. #112692.

1—G.E. Motor DC 35 HP 129 amp. 230 volts 700 RPM DLC 202 Form A Compound Ser. #434542, complete with starting control.

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1—Wright Electric Hoist 1,000 lb. capacity 230 volts DC 1200 RPM Ser. #27668.

3—ILG Ventilating Fans ¼ HP 230 volts DC 855 RPM.

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1—Westinghouse DC Motor 10 HP 40 amp. 230 volts 1725 RPM Frame 60L Ser. #1438833.

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1—Horizontal Rotary Digester 8' dia., 29' long with gearing reduction.

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1—Thorpe Hydraulic Press complete with 4 steam platen plates 40" x 40", and one Equalizer Pump.

1—Five cylinder Holyoke Duster.

1—Two-color Kidder Rotary Press, with various plates and printing rolls.

3—Beaters, 1000 lb., cast iron tub, complete with roll.

2—Beaters, high speed, 2000 lb., cast iron tub, complete with roll.

1—Banded type Emerson Beater Roll, 54" face, 56" diameter, complete with stands.

MISC.

Platform Scales.
Paper Testing Equipment.
Two-wheeled hand trucks.
One Shartle Bros. Duplex Stock Pump 8 x 16.

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Trim over 100"
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All cash deal.

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WANTED

Board Machine complete, six cylinder 92 inches to 100 inches trim.

Dryers—Up to 90;—36 inch or 42 inch, 96 inches to 106 inches face. Address Box 46-777—Paper Trade Journal. N-7

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WANTED

Dryers—38" face minimum x 36" to 60" diameter complete with bearings, gears and frames.

4 to 6—Dryers—85" face x 36" diameter complete with bearings, gears and frames.

2—Rubber worm felt rolls—85" face. Journals 1 7/16" dia. x 8" long.

1—Supercalender stack—7 to 10 rolls—50" face minimum.

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N-21

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N-14

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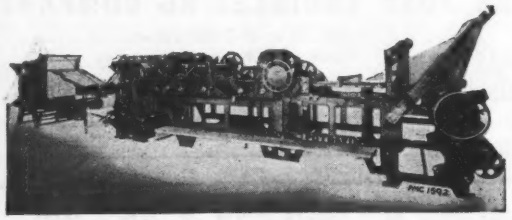

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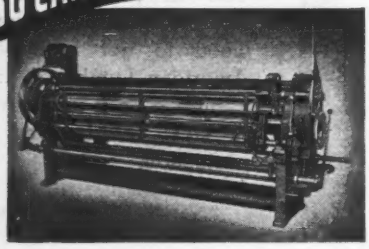

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Carthage Machine Co.
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Wks.

GRINDING WHEELS
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
Norton Company
United States Rubber Co.

HEAT EXCHANGERS
Foster Wheeler Corp.
Stickle Steam Specialties Co.

HEAT RECOVERY SYSTEMS
Foster Wheeler Corp.
Stickle Steam Specialties Co.

HEATING, VENTILATING AND AIR CONDITIONING
The Appleton Machine Co.
Armstrong Machine Works
Cochrane Corp.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Worthington Pump & Machy. Corp.

HOISTS
Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.
Reading Chain & Block Corp.

HOSE (Air, Water, Suction, etc.)
The Cincinnati Rubber Mfg. Co.
Raybestos-Manhattan Inc. Manhattan Rubber Division
United States Rubber Co.

HUMIDITY CONTROL
Spray Engrg. Company
Steamaire Company

HYDRAPULPERS
Ross Paper Machy. Co.

INSTRUMENTS, TESTING AND MEASURING
Bauer Brothers Co.
N. P. Bowsher
The Bristol Company
Cochrane Corp.
The Foxboro Company
General Electric Company
W. & L. B. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taber Instrument Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Wallace & Tiernan Instrument Co.
Williams Apparatus Co.

WHERE TO BUY

INSULATION
Johns-Manville Sales Corp.

JOINTS
Perfecting Service Company

JORDAN FILLINGS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black-Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Valley Iron Works Co.

KNOTTERS
Fibre Making Processes, Inc.

LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
The Biggs Boiler Works Co.
W. H. & L. D. Betz
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Taber Instrument Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works
Williams Apparatus Co.

LAY BOYS
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers

LINTER COTTON
The Railway Supply & Mfg. Co.

LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

LUBRICATORS
Hills-McCanna Co.

MATERIAL HANDLING
Automatic Transportation Co.
Brooks Equipt. & Mfg. Co.
Northwest Engrg. Co.
Reading Chain & Block Company

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Testing Machines, Inc.
Walker-Goulard-Plehn Co.

MOISTENING EQUIPMENT
The Spray Engineering Co.
Steamaire Company

MOISTURE CONTENT CONTROL
Spray Engrg. Company
Steamaire Company
Stickle Steam Specialties Co.
Williams Apparatus Co.

MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
Continental Electric Co.
De Laval Steam Turbine Co.
General Electric Co.
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation

NOZZLES
Spray Engrg. Company
Steamaire Company

PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.

PACKING
Johns-Manville Sales Corp.
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Bagley & Sewall Co.
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Wks.
Valley Iron Works Co.

PAPER MILL BUILDERS
Merritt-Chapman & Scott Corp.
The Rust Engrg. Co.

PAPER TUBE MACHINERY
Theo. Adams
Dietz Machine Works
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
South Wabash Engrg. Co.

PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corp., John

PENSTOCKS, WELDED STEEL
The Biggs Boiler Works Co.

PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.

PIPE
Black-Clawson Company
Crane Company
Deublin Company
Grinnell Company
Johns-Manville Sales Corp.
Shartle Brothers Machine Co.
Stowe-Woodward, Inc.
Taylor Forge & Pipe Works
Walworth Company

PLATERS
Perkins & Son, Inc., B. F.

PLATES
Black-Clawson Company
Hendrick Mfg. Co.
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.

PLATE WORK (Steel & Alloy)
The Biggs Boiler Works Co.

PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.

PRESSURE VESSELS, STEEL AND ALLOY
The Biggs Boiler Works Co.
Foster Wheeler Corp.

PRESSES
Black-Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
Fibre Making Processes, Inc.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Rotogravure Engineering Co.
Shartle Brothers
South Wabash Engrg. Co.
Valley Iron Works Co.
Waldron Corp., John
Weber, Herman G.
Williams Apparatus Co.

PULPERS
Bauer Brothers Co.

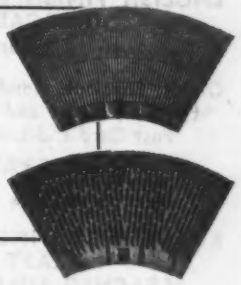
PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Elof Hansson, Inc.
Lyddon & Co. (America) Inc.
Parsons & Whittemore, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.

PULPSTONES
Norton Company

PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Buffalo Pumps, Inc.
Dorr Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hardinge Co., Inc.
Hills-McCanna Co.
Ingersoll-Rand Co.
Johnson Corp.
Moore & White Co.
Morris Machine Works
Nash Engineering Co.
Noble & Wood Machine Co.
Paper Converting Mch. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Steamaire Company
Warren Steam Pump Company
Worthington Pump & Mchy. Corp.

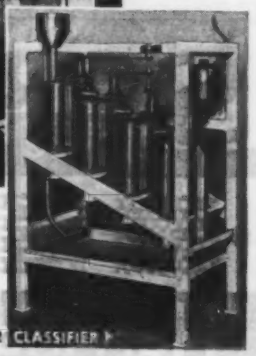
BAUER PULPER

KNOW YOUR STOCK



Scientific study of your stock may result in new or improved grades. Such studies are daily being conducted at the Bauer Fibre Products Laboratory for mills across the country. In fact, the "lab" is booked solid for weeks and weeks ahead. It might be to your advantage to forward samples of your stock for study—perhaps send someone to take part in the various tests that would be made.

VIEW OF EVER-BUSY BAUER LABORATORY



BAUER CLASSIFIER

● *Builders of Bauer single and double disc pulpers for salvage of rejects and screenings and processing of semi-chemical fibre.*

Bauer
BAUER BROS. CO.
SPRINGFIELD, OHIO

West Virginia Pulp and Paper Company

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New York

35 East Wacker Drive
Chicago

Public Ledger Building
Philadelphia, Pa.

503 Market St.
San Francisco, Cal.

Manufacturers of

ENGLISH FINISH BOOK
SUPERCALENDERED BOOK
and LITHOGRAPHIC PAPERS

Offset, Envelope, Bond, Writing, Mimeograph, Ledger, Eggshell, Cover and Music Papers, Index Bristol, Post Card and Label Papers, Machine Coated

HIGH GRADE COATED BOOK

• • • •

KRAFT WRAPPING AND KRAFT ENVELOPE
KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

MILLS:

Mechanicville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Charleston, South Carolina

MISCO "C"

THE CORROSION RESISTANT ALLOY

CAST • ROLLED • FABRICATED

for all equipment exposed to corrosion by sulphite acids

MICHIGAN STEEL CASTING CO., DETROIT 7, MICH.

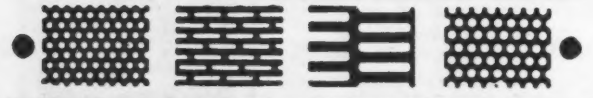
Jordan Shell and Plug Fillings

TRADE-MARK
POSITIVE
Reg. U. S. Pat. Off.

High Speed Disc Refiner

THE BAHR BROTHERS MFG. CO.
MARION, INDIANA, U.S.A.

SCREENS of Perforated Metal



The Harrington & King PERFORATING Co.

5652 Fillmore St., Chicago 44, Ill.
114 Liberty St., New York 6, N. Y.

WHERE TO BUY

RAG CUTTERS
B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

RECOVERY SYSTEMS
Bulkley, Dunton Pulp Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones
Ross Engineering Corp., J. O.
Valley Iron Works Co.

REELS
Black-Clawson Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hudson Sharp Machine Company
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Rodney Hunt Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
The Hermann Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J., Mfg. Co.
Noble & Wood Machine Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout, Waldron & Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
The Bristol Company
The Brown Instrument Co.
Cochrane Corp.
The Foxboro Company
Jones, E. D., & Sons Co.
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Shartle Brothers
Stickle Steam Specialties Co.
Taylor Instrument Companies
Trimbey Mach. Wks.
Wallace & Tiernan
Westinghouse Electric Corporation

RESINS
Amer. Cyanamid & Chemical Corp.
Amer. Resinous Chemicals Corp.
Monsanto Chemical Co.
The Resinous Prod. & Chem. Co.

ROLLS
Appleton Machine Co.
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Improved Paper Machy. Corp.
Lobdell Co.
Montague Machine Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Perkins, B. F., & Sons Co.
Philbrick Engrg. & Machine Co.
Pusey & Jones Corp.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Roehlen Engraving Works
J. J. Ross Company
Ross Paper Machy. Co.
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Sinclair Co.
Smith & Winchester Mfg. Co.
Stearns Magnetic Mfg. Co.
Stowe-Woodward, Inc.
United States Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward, Inc.

ROLL STANDS
Cameron Machine Co.
The Kohler System Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.

ROOFING MATERIALS
Johns-Manville Sales Corp.

ROTARY BOILERS
Biggs Boiler Works

SATURATING MACHINES
Black-Clawson Company
Moore & White Co.
Noble & Wood Machine Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

SAVEALLS
Bulkley, Dunton Pulp Co., Inc.

SCALES
Merrick Scale Mfg. Co.

SCREEN PLATES
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Testing Machines, Inc.
Union Machine Co.
Union Screen Plate Co.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co.
Hendrick Manufacturing Co.
E. D. Jones & Sons Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Trimbey Mach. Wks.
Valley Iron Works Co.

SHEET MACHINES
Thomas W. Hall Co.
The Hermann Manufacturing Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
Valley Iron Works Co.
Williams Apparatus Co.

SHOWER PIPES
Bird Machine Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
Moore & White Co.
Shartle Bros. Mach. Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.

SIZING
Amer. Cyanamid & Chemical Co.
Amer. Resinous Chemicals Corp.
Black-Clawson Company
The Dow Chemical Company
du Pont, E. I., de Nemours & Co.
Flintkote Company
Kelco Company
Monsanto Chemical Co.
National Oil Products Co.
Paper Makers Chemical Department, Hercules Powder Co.
Philadelphia Quartz Co.
Pioneer Salt Company
Socony-Vacuum Co.
Stein, Hall & Co., Inc.

SLIME CONTROL
Falls Chemical Products Co.
Magnus Chemical Co.
Mallinckrodt Chemical Wks.

SLITTERS
Theo. Adams
Black-Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Valley Iron Works Co.
Waldron Corp., John

SMOKE STACKS
The Biggs Boiler Works Co.

SOLENOID VALVES
Steamaire Company

†SPRAYING EQUIPMENT
The Spray Engineering Co.
Steamaire Company

†STAINLESS STEEL
Anti-Corrosive Metal Products Co., Inc.

†STARCH
Amer. Cyanamid & Chemical Corp.
Clinton Industries, Inc.
National Starch Products, Inc.
Stein, Hall & Co., Inc.

†STATIC ELIMINATORS
Steamaire Company

WHERE TO BUY

STEAM SPECIALTIES
Babcock & Wilcox Co.
Cochrane Corp.
Johnson Corp.
Perfecting Service Company
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

STEEL TANKS
The Biggs Boiler Wks. Co.

STRAPPING & STRAPPING MACHINES
Acme Steel Company
The Stanley Works

STUFF CHESTS
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
Valley Iron Works Co.

SUCTION BOXES
Black-Clawson Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Westinghouse Electric Corp.

SULPHUR
Amer. Cyanamid & Chemical Corp.
Stauffer Chemical Company
Texas Gulf Sulphur Co.
Witco Chemical Company

SULPHUR BURNERS
Valley Iron Works Co.

SULPHUR DIOXIDE
Ansul Chemical Company

SUPERCALENDERS
B. F. Perkins & Son, Inc.

TALC
Amer. Cyanamid & Chemical Corp.
W. H. Loomis Talc Corp.

TANKS
Cochrane Corp.
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
The Noble & Wood Machine Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Rodney Hunt
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Stowe-Woodward, Inc.
United States Rubber Co.
Waldron Corp., John
B. F. Perkins & Son, Inc.
Testing Machines, Inc.

THICKENERS, DECKERS AND SAVEALLS
Bird Machine Company
Bulkley, Dunton Pulp Co., Inc.
Carthage Machine Co.
Dilts Machine Works
Dorr Co.
Downingtown Mfg. Co.
Hardinge Co., Inc.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
Valley Iron Works Co.

TILE
Holyoke Drainer Tile Co.

TITANIUM
E. I. du Pont de Nemours & Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.
Witco Chemical Company

TOOLS
Acme Steel Company
Ingersoll-Rand Co.
The Stanley Works
Walworth Company

TRUCKS
Automatic Transportation Co.

TRAPS
Armstrong Machine Works
Cochrane Corp.
Crane Co.
Grinnell Company.
Johnson Corporation
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

TUBS
Rodney Hunt Machine Co.
Noble & Wood Machine Co.
Shartle Brothers
Valley Iron Works Co.

TURBINES
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Company
Hunt, Rodney, Mach. Co.
Westinghouse Electric Corp.
Worthington Pump & Machy Corp.

TURPENTINE RECOVERY
Foster Wheeler Corp.

USED EQUIPMENT
Frank H. Davis Company
Gibbs-Brower Co.
Thomas W. Hall Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
Ross Paper Machinery Co.
Shartle Brothers Machine Co.

VALVES
The Bristol Company
Cochrane Corp.
Crane Company
Dilts Machine Works
Fibre Making Processes, Inc.
The Foxboro Company
E. D. Jones & Sons Co.
Magnus Metal Corp.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Permutit Company
William Powell Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies
Trimbey Mach. Wks.
Valley Iron Works Co.
Walworth Company

VALVES, LUBRICATED PLUG
American Car & Foundry Co.

VATS & VAT PARTS
Union Machine Co.
Union Screen Plate Co.

WASHERS
Bird Machine Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

WATER CONDITIONING
Cochrane Corp.
The Permutit Company

WATER DISPERSIONS
American Anode, Inc.

WAXING MACHINERY
Black-Clawson Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

WELDING EQUIPMENT
Allis-Chalmers Mfg. Co.
General Electric Company
Walworth Company
Westinghouse Electric Corp.

WET MACHINES
Black-Clawson Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Moore & White Co.
Montague Machine Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

WINDERS AND REWINDERS
Black-Clawson Company
Cameron Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co.
Hudson-Sharp Mach. Co.
Langston Co., Samuel M.
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks
Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Waldron Corp., John

WIRES
Appleton Wire Works
Black-Clawson Company
Bulkley, Dunton Pulp Co., Inc.
Cheney Bigelow Wire Works
Hayden Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Shartle Brothers Machine Co.

WOOD PEELERS
Nekoosa Fdy. & Mch. Wks., Inc.

WOOD SPLITTERS
Carthage Machine Co.

CLAFLIN REFINER

CONTINUOUS BEATING: Three No. 2 Claflins in series. Furnish of Southern Bleached Kraft — 50 tons/day. Pulping operation—through three Claflins—to beaters used only for mixing—to Jordans for final cutting control to paper machine. Total of 540 h.p. on Claflins. Freeness drop from 685 c.c. to 310 c.c.

BATCH BEATING: No. 2 Claflin — Furnish of Southern Bleached Kraft—2,000# batch. Stock pumped from chest into Claflin to another chest. At end of 15 minutes and two passes, Freeness 548, a drop of 72 c.c. At end of 30 minutes, after 4 passes, Freeness 476, drop of 144 c.c. At end of 45 minutes and 6 passes, Freeness 400, drop of 220 c.c. Mullen 72%—548 c.c., 102%—476 c.c. and 145%—400 c.c.

Adaptable also for brushing out fibre bundles and lumps with minimum degree of cutting and reduction of Freeness. (Tissues).

LARGER CAPACITY NO. 3 SOON AVAILABLE

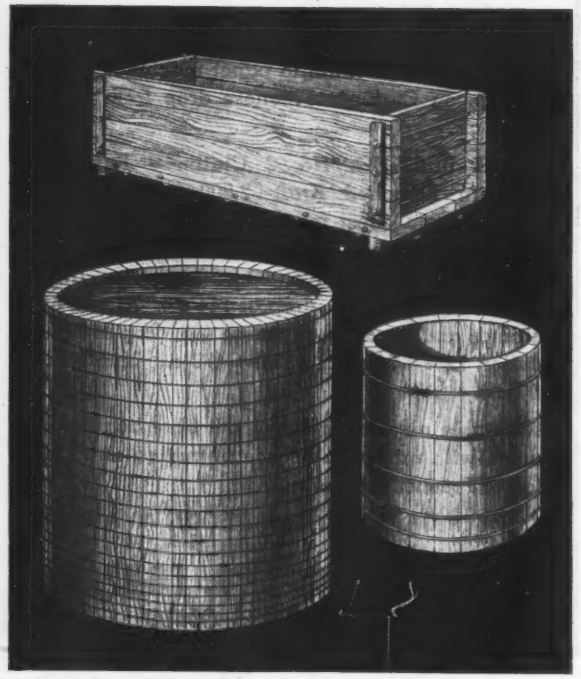
THE HERMANN MFG. COMPANY
LANCASTER, OHIO

PRICE & PIERCE, Ltd.

WOOD PULP & PAPER AGENTS
for domestic and export

60 EAST 42nd STREET
New York 17, N.Y.

KALAMAZOO Wood Tanks



for ALL PAPER MILL NEEDS

Wood tanks are highly practical for certain uses, such as head boxes—blow pits—acid storage—fire protection, etc. Remember — Kalamazoo has specialized on Wood Tanks for over 75 years. This organization knows your industry and has facilities for supplying tanks of any size and shape, and in any wood desired. Lead or asphalt linings, corrosion-proof hardware, false bottoms, agitators, or any special type of equipment also supplied.

Send your specifications and we will be glad to quote prices.

KALAMAZOO TANK & SILO CO., Kalamazoo, Michigan

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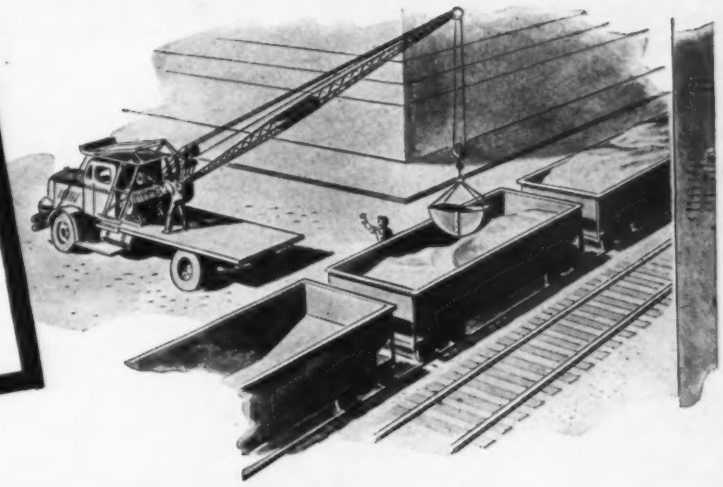

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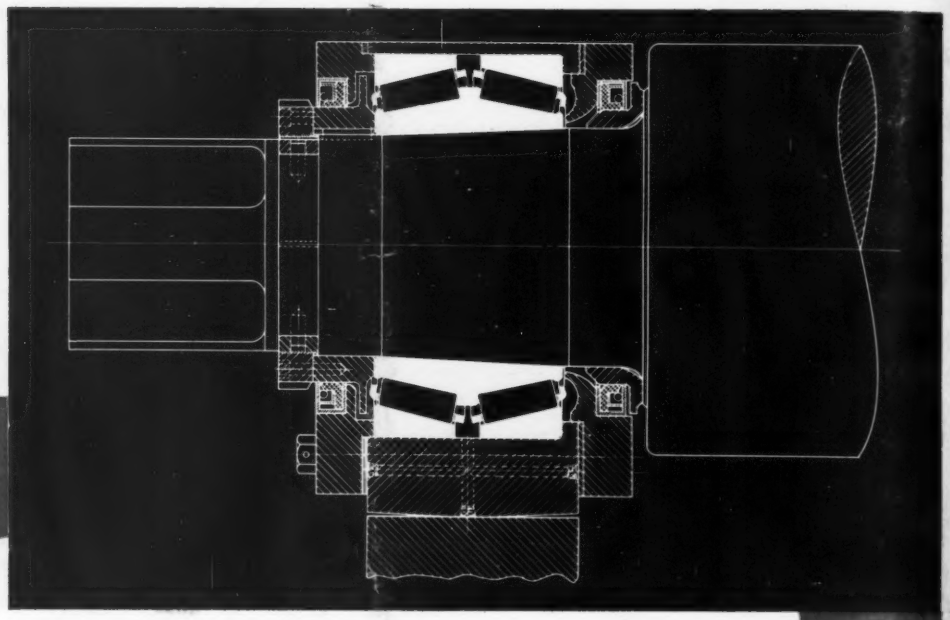

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